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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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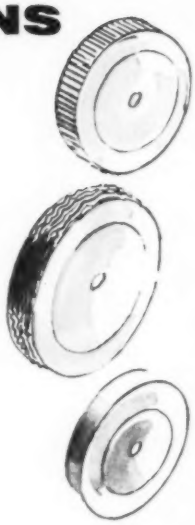

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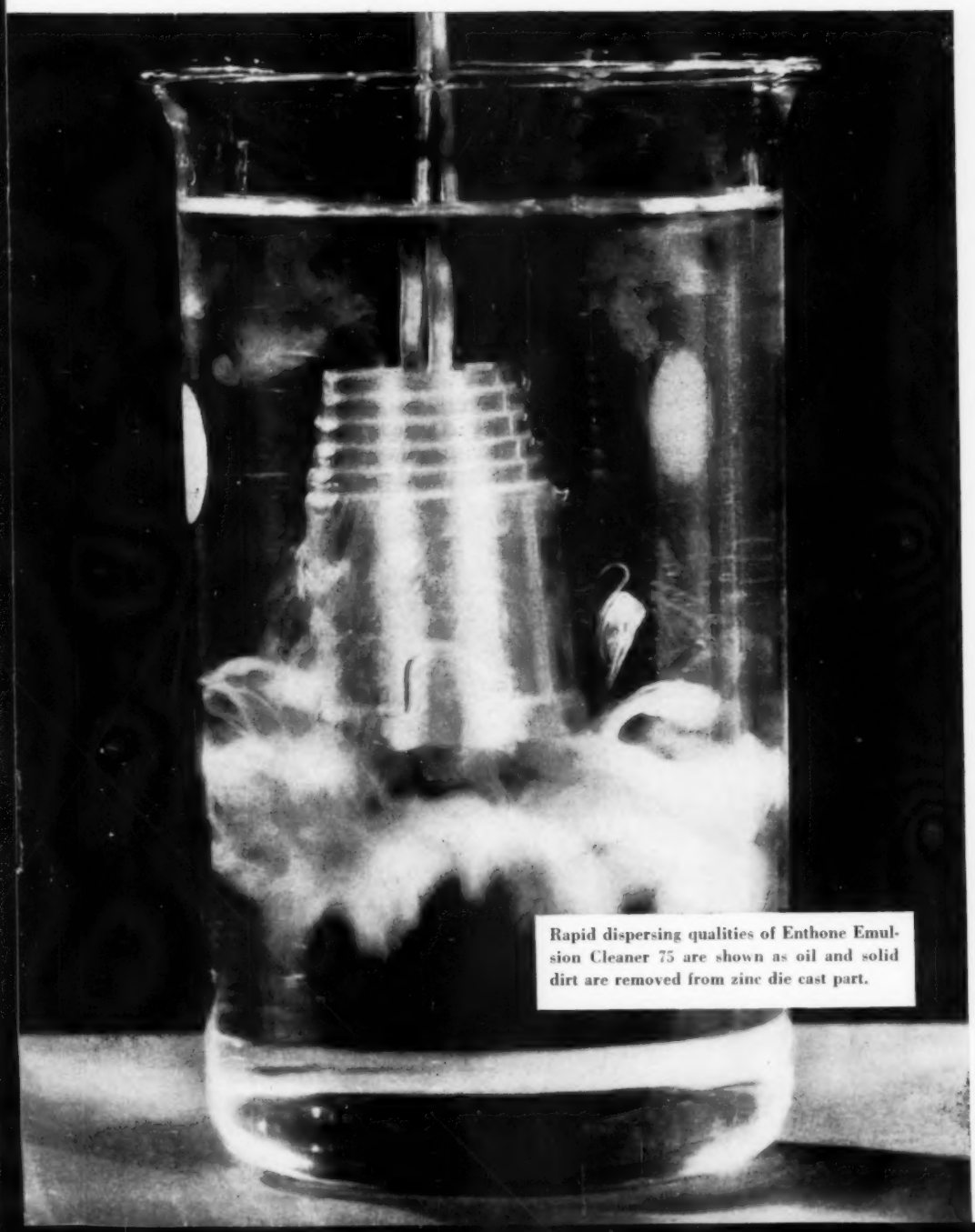

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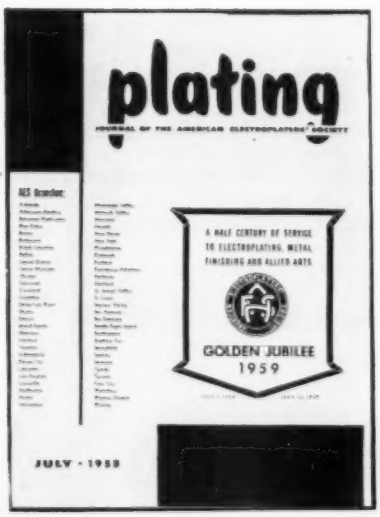
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A HALF CENTURY OF SERVICE TO ELECTROPLATING, METAL FINISHING AND ALLIED ARTS
GOLDEN JUBILEE
1959
JULY - 1959

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Journal of the American Electroplaters' Society

July 1958 — **Vol. 45, No. 7**

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Years of research work performed by The Harshaw Chemical Company revealed that for satisfactory corrosion resistance the nickel deposit must be *sulfur free*. This fact lead to the development of the Perflow nickel plating process. Further research revealed that the utilization of the sulfur-free deposit as a base coating, following by a bright nickel from a compatable bath, would further improve corrosion resistance. Performance data from a number of leading car manufacturers indicate that the Harshaw Perflow-Perglow Duplex nickel plate is comparable to, and frequently better than, buffed grey nickel, and is unequalled by any bright nickel.

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The Harshaw Perflow-Perglow Duplex Nickel Plate is easily chrome plated with no unusual treatment of the nickel necessary even over extended periods of time.

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The Perflow-Perglow Duplex Nickel has excellent leveling characteristics which aid in producing bright deposits on poorly polished steel or over dull copper plate. The leveling characteristics can be maintained without sacrificing ductility, brightness, and corrosion resistance.

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The Perflow-Perglow process has a high tolerance to impurities from the standpoint of both corrosion resistance and overall quality of plate.

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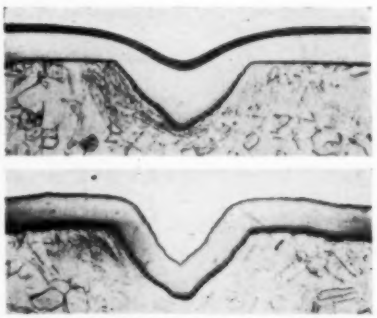
Excellent Ductility at Full Brightness! The ductility of the Perflow-Perglow Duplex Plate is comparable to that of a plate from a Watts nickel bath.



The above photomicrographs demonstrate the leveling effect of Harshaw Duplex Nickel as compared to that of conventional grey nickel.

Top: *Perflow-Perglow Duplex Nickel—depth of scratch 2.7 mils.*

Bottom: *Grey nickel—depth of scratch 2.7 mils.*

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EDITORIAL

AES AT ITS HALF-CENTURY MILEPOST

A FEW YEARS AGO, I had the privilege of writing its seventy-year biography for a great American corporation whose name is a household word on most continents. In tracing its transition from humblest origins to worldwide stature and respect, I was impressed by many characteristics that threaded its long life, including this apt appraisal penned, on the occasion of its Golden Anniversary, by its then-President.

"A man," he wrote, "may live fifty years without accomplishing anything. But it is virtually impossible for a concern to be in business for fifty years and not have some sort of a record. A man may stand still but a company either has to go ahead or step backward. A company that has survived the competitive struggles for fifty years must at least have sound policies . . ."

Like that company and the many others that built heritage and record by service, the American Electroplaters' Society (AES) has survived the vicissitudes of five decades of life because it has consistently benefitted its members and the public interest through fostering knowledge and advancement in electroplating, metal finishing and allied arts.

As the National Electro Platers Association of the United States and Canada (NEPA), the AES was created in 1909 when the United States had 46 states and a population of about 90 million, with less than 200,000 automobiles and 6000 trucks on its assembly lines. From New York genesis, it branched to Philadelphia where a Branch was originated in 1910. The Society became international with the birth of its Toronto Branch in 1912. NEPA became AES in 1913, the transition occurring at its First National Convention on June 1, 1913 in New York. A year later, the Society's three-year old magazine, "Quarterly Review" became "Monthly Review," immediate forerunner of today's PLATING.

Numbering some 1500 members and 25 Branches by 1929, AES spanned the American continent that year by the founding of its Los Angeles Branch. That same year, it also completed its first AES Research Project. Then came depression—the New Deal—World War II. And in one of those war years, 1944, it entered Australia.

War's-end sparked AES's halcyon 12-year period to date. Between 1946 and 1958, its Branches swelled from 38 to 58. Its membership, in all classifications, catapulted to nearly 7900. PLATING MAGAZINE had succeeded "Monthly Review" in 1948 and, within a decade, enjoyed the largest ABC paid circulation in its field. AES had entered our Southland with its Southeastern Branch in 1947, and had penetrated the Lone Star State with its Dallas-Fort Worth Branch in 1951. By 1958, threshold of its Golden Anniversary, its Branches consequently numbered 50 in the United States, 5 in Canada, 3 in Australia.

As this is written, the AES launches its FIFTIETH ANNIVERSARY. It will be observed by Branch events between now and June 1959, and will be climaxed by the Golden Jubilee Convention and Industrial Finishing Exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing, to be conducted in Detroit, June 15–19, 1959, with its Detroit Branch as host. And introduced above is the Golden Jubilee insigne approved by the Executive Board, that, through AES's anniversary year, will appear on stationery and elsewhere. It will thus serve both as a symbol of proud recognition of a half-century's AES service, and as a reminder of the challenge of today and tomorrow.

John P. Nichols
Executive Secretary

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FIFTH DECADE	1959
	1958
	1957
	1956
	1955
	1954
	1953
	1952
	1951
	1950
FOURTH DECADE	1949
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	1942
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THIRD DECADE	1939
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SECOND DECADE	1929
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FIRST DECADE	1919
	1918
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	1916
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	1914
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	1912
	1911
	1910
	1909

THE American Electroplaters' Society (AES) observes its Fiftieth Anniversary from July 1, 1958 through June 30, 1959.

NOT only will that observance be climaxed by the Golden Jubilee Convention and Industrial Finishing Exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing, to be held in Detroit, June 14-19, 1959 with the AES's Detroit Branch as host BUT ALSO by PLATING MAGAZINE'S Golden Jubilee Issue to appear in June 1959.

A LARGE feature issue beamed both for immediate interest to PLATING'S global circulation and for long retainment as an AES reference source and as a memento of this once-in-a-lifetime, year-long observance, this issue will provide advertisers with a unique opportunity to reach the vast purchasing power in this field served by PLATING MAGAZINE, AES's official journal.

DEMAND for advertising space looms large, both for institutional and product advertising. Assure yourself of accommodation by placing your insertion order NOW, particularly for special, preferred or premium positions.

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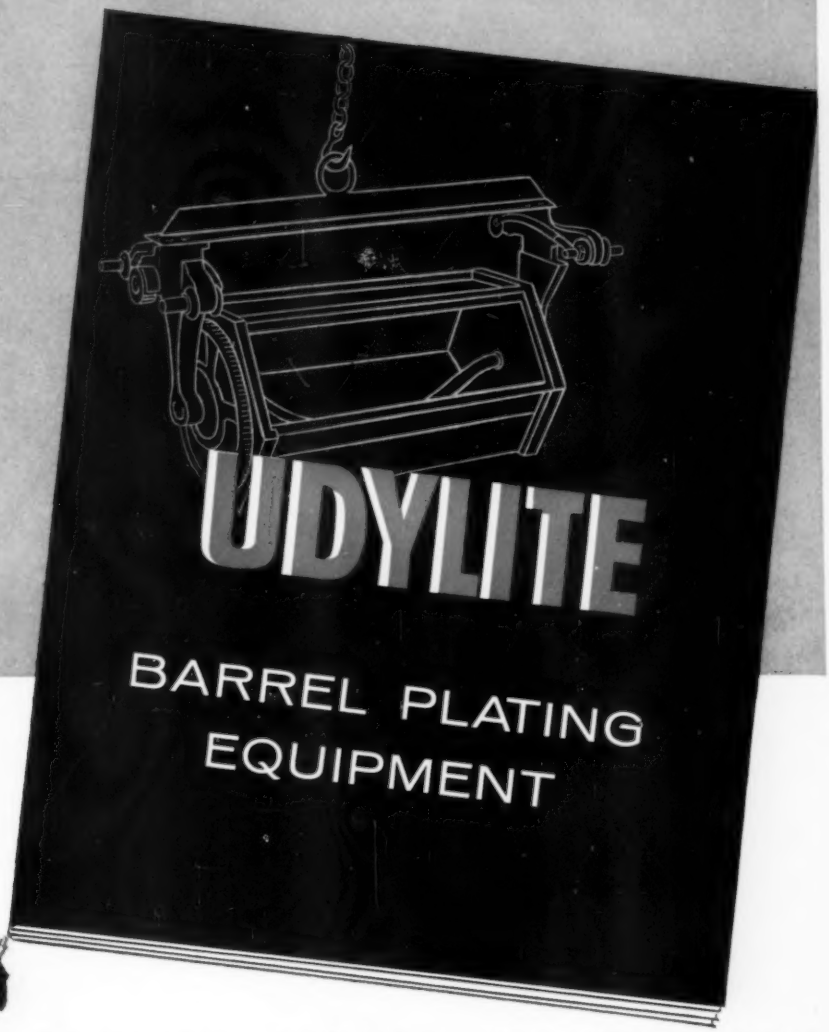

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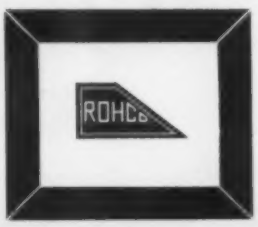

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1. *Built-in cure indicator assures maximum performance*
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5. *Highly qualified technical service.*

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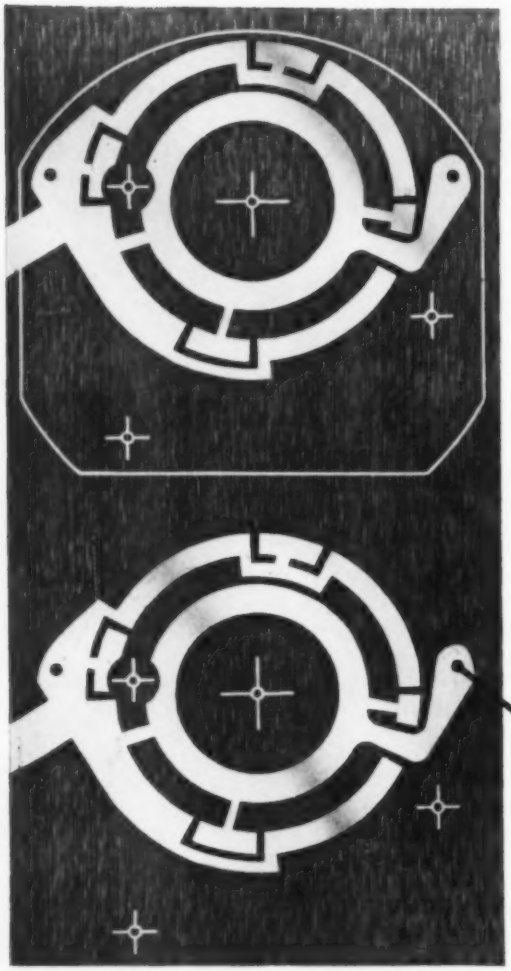
Now you can plate THROUGH holes in printed circuits with NEW CuSOL PROCESS



Photomicrographic cross-section of printed circuit shows how the CuSOL process permits plating through holes in core stock.

Plating *through* holes in printed circuits is only one big feature of Seymour's new CuSOL* process. Besides the exceptional throwing power which makes this new, exclusive Seymour process ideal for plating of printed circuits CuSOL has other features which make it unique and useful to copper plating.

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CuSOL permits smoother, more ductile deposits of any thickness than is possible with molasses, bone glue or dextrin baths.

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CuSOL deposits are easy to buff.

CuSOL copper plate is hard (75 on Rockwell F scale).

CuSOL permits use of wide current density range and increases plating speeds from 50% to 200%.

CuSOL is inexpensive to use and economical to maintain.

* Patent Applied For

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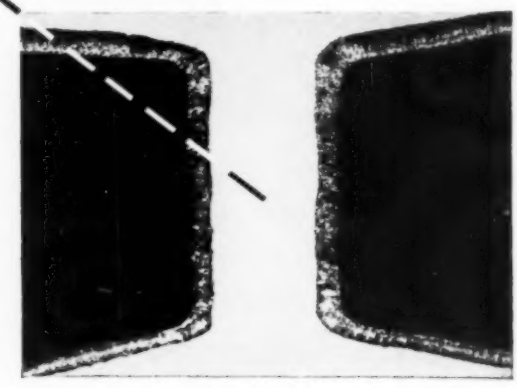
CuSOL vs DEXTRIN TYPE BATHS

	CuSOL	DEXTRIN
Tensile Strength	41,000 psi	33,000 psi
Elongation in 2 in.	23%	16%
Rockwell "F" Scale	75	66
Ductility	4 bends on itself	2 bends on itself

(Thickness of copper specimens tested was 0.033")



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For almost twenty years PROMAT has been supplying the metal finishing industry with the finest in chemical products and processes relating to the finishing treatment of metals.

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Thickness of plate, lustre, finish—all are governed by temperature. To control temperature, to keep it at the one best level, is to control these factors.

TRERICE No. 90400 Indicating Self-Operating Regulators maintain *precise* temperatures *automatically* . . . eliminate the hazards of trial and error. They prevent evaporation losses, cut down on rejects and insure uniform plating quality. You save time, labor, fuel costs.

TRERICE No. 90400 regulators are completely self-contained, self-operating . . . require no electricity or air. Regulator and thermometer operate independently for positive double-check accuracy. Bulbs and capillaries are adapted to individual requirements for highest resistance to corrosive action of metal finishing solutions.

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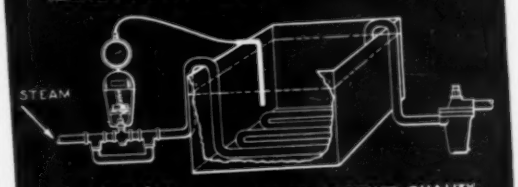

Send Today for Bulletin 803—TRERICE TEMPERATURE CONTROLS for the Metal Finishing Industries

H. O. TRERICE CO. 1426 W. Lafayette Blvd., Detroit 16, Mich.
Factory representatives in principal cities of U.S. and Canada

A Timely Message on

"Launching Missiles of the Mind"

by Ben P. Sax

Chairman of the Board, *American Buff Company*

Curiosity and enthusiasm create a potent "fuel" that fires man's imagination . . . launches "guided missles of the mind" that circle physical objects or mental images in areas as varied as men and their interests. In all ages, minds "orbiting" around individual problems and concepts have produced effective understanding and new solutions for concrete as well as intangible questions.

In the metal finishing industry, our own company has launched many a mental rocket. Visionary conceptions have been projected into practical accomplishment . . . unique tools and methods, which in turn help to provide many of the parts for mighty, mechanical rockets which launch actual missiles, as well as manufacturing economies to bring products within easier buying reach of the mass market.

In the thick of today's printed, spoken and electronically communicated information, fresh ideas can the more readily be born, mental stimulii more frequently engendered.

All of us today should concern ourselves with the spread of *more interesting* educational material, revealing to young men and women, *and* boys and girls, the exciting world which opens from every new avenue of an educated mind. The youth of today can become our greatest pool of future strength, if its appetite for higher education and scientific knowledge is properly whetted.

Sincerely,

Ben P. Sax

"For the job that's TOUGH—use an AMERICAN BUFF"

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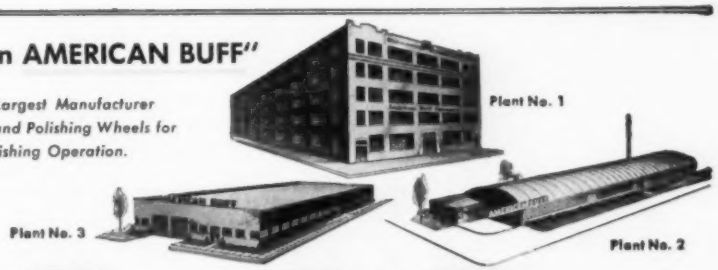

American Buff Company
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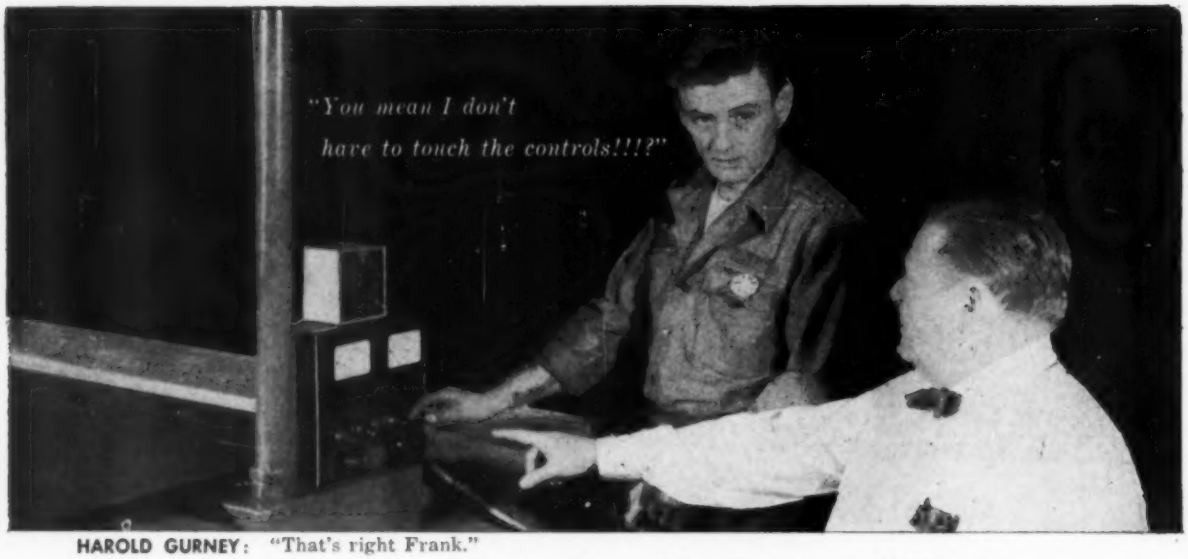
AMERICAN BUFFS ARE REGULARLY ADVERTISED IN FORTUNE MAGAZINE



HAROLD GURNEY: "That's right Frank."
"*This* unit is specially designed for anodizing. With this new RAPID rectifier, output current adjusts itself automatically to compensate for load changes."

Plating Foreman: "You mean I set it once and forget it?"

Harold Gurney: "Right again. You see, the unit continuously senses load variations and automatically maintains a constant current density per square foot of work."

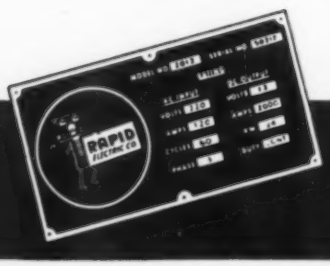
Plating Foreman: "That makes it a lot easier to accurately control a pre-determined film thickness in anodizing."

Harold Gurney: "You're catching on fast. And what's more, Automatic Current Density Control eliminates the possibility of overcurrent and subsequent costly rejects, maintaining Fenn's high quality standards."

Take a tip from Harold Gurney. Find out how ACA can save you both time and money.

Write for Rectifier News Bulletin Vol. 2, No. 1 or ask to have a representative call. No obligation of course.

Fenn Manufacturing Company Newington, Connecticut



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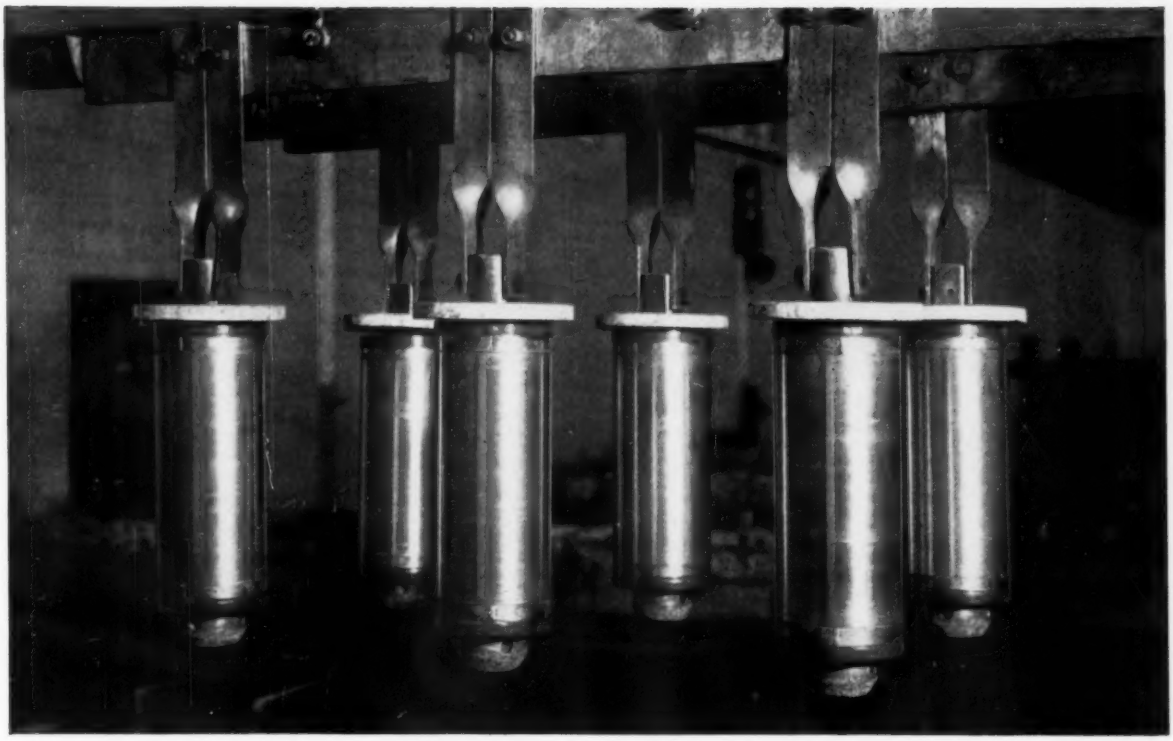

These six arbors of piston rings have just emerged from a chrome plating bath at the Koppers Company's Baltimore plant. Consistently low sulfate content of Mutual Chromic Acid helps insure flawless finish on critical parts like these.

To insure a uniform, flawless chrome finish use

MUTUAL *LOW SULFATE* CHROMIC ACID

When chrome plating must be perfect – when anything less means a profit-eating reject – you can rely on Mutual Chromic Acid to reinforce your technical skill.

Mutual Chromic Acid is always 99.75% pure – or better. Sulfate content never exceeds 0.1%. This consistently low sulfate content of Mutual Chromic Acid makes it easy for you to control the acid-sulfate ratio of your plating bath. It is your insurance against plating difficulties.

Send today for the free Mutual booklet, "Chromium Chemicals," which contains useful technical information about the entire line of Mutual chromium chemicals. A Technical Service Staff is also available, to offer help or information at any time.

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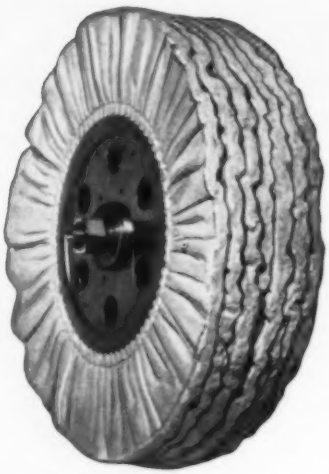

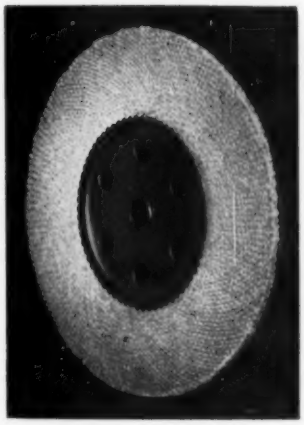

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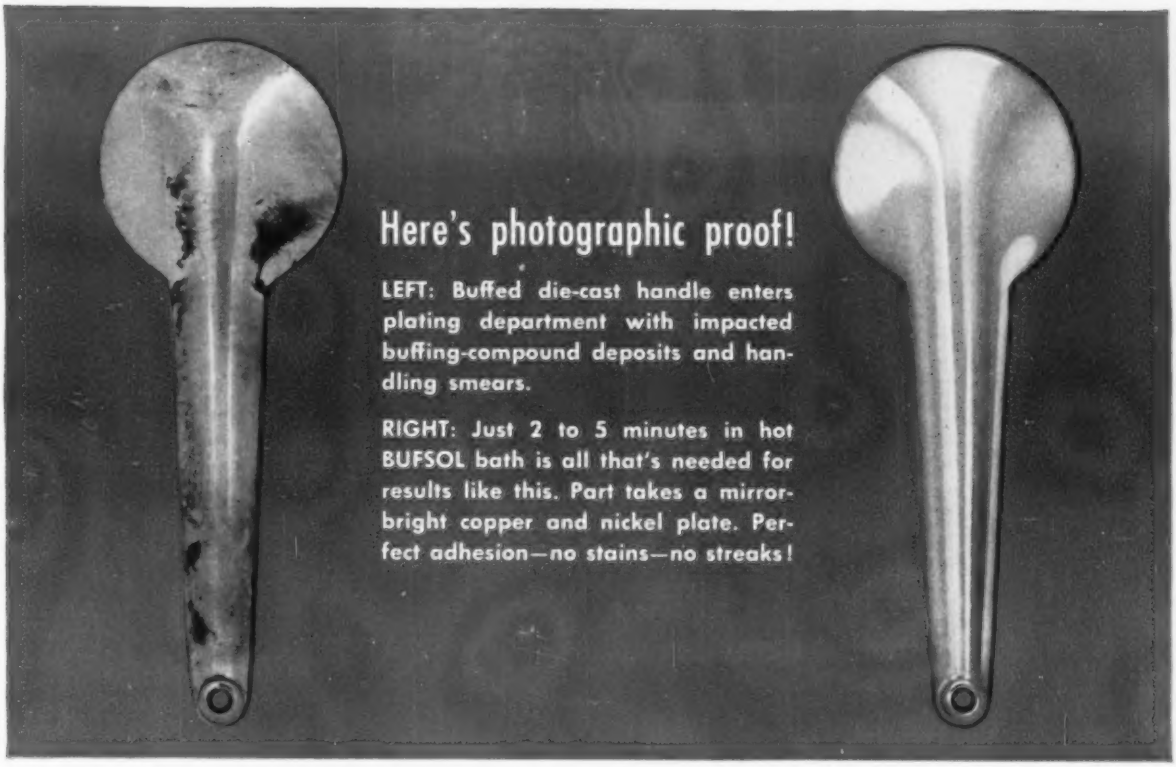
REMOVES STUBBORN BUFFING COMPOUNDS WITHOUT SOLVENTS


Here's photographic proof!
LEFT: Buffed die-cast handle enters plating department with impacted buffing-compound deposits and handling smears.
RIGHT: Just 2 to 5 minutes in hot BUFSOL bath is all that's needed for results like this. Part takes a mirror-bright copper and nickel plate. Perfect adhesion—no stains—no streaks!

. . . adaptable to every plating cycle

New BUFSOL is fast, safe, effective . . . the perfect solution to your plating department's No. 1 headache—buffing-compound removal. Check these performance features:

Highly effective: BUFSOL assures bright, stain-free, adherent electrodeposits—removes most buffing compounds, tripoli, and rouges—rapidly removes water-dispersible-type compounds.

Concentrated: BUFSOL solutions have long life even when loaded with buffing compound. BUFSOL is completely miscible in water, is used as a dilute solution.

No plating bath contamination: BUFSOL, a liquid detergent concentrate, rinses easily from recesses and damaged rack coatings. Can't interfere with electrocleaner performance!

Safe on metals: BUFSOL will not etch, darken, or attack zinc-base die castings, copper, brass, steel, or aluminum when used at recommended concentrations and temperatures.

Essentially odorless: BUFSOL produces no obnoxious fumes or odors, requires no special ventilation.

For full information on new BUFSOL, and other Wyandotte metal-cleaning products, call in a skilled Wyandotte representative today! *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

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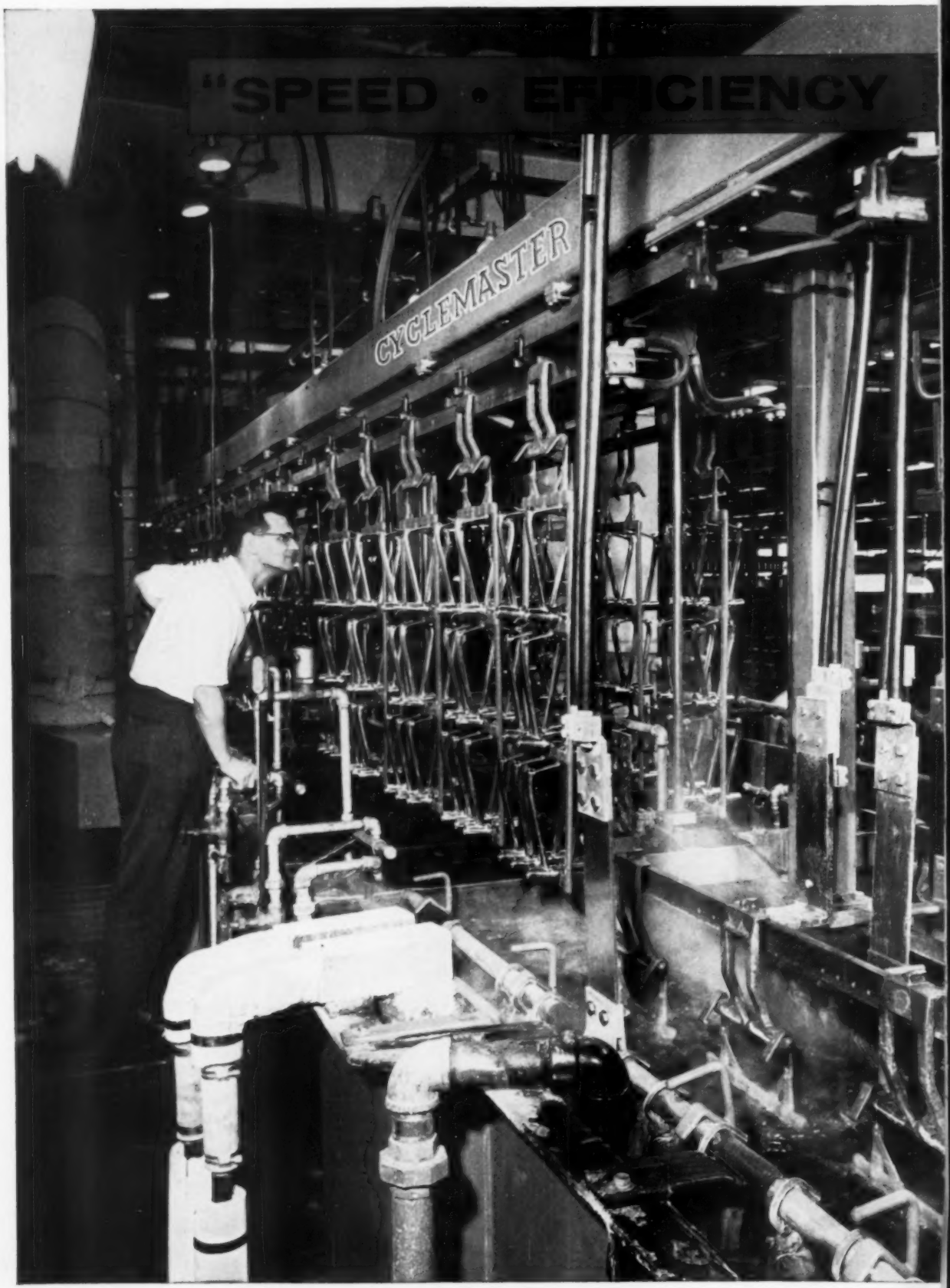
THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING



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• ACCURACY . . .

THAT'S WHAT OUR UDYLITE AUTOMATIC MEANS TO US!"

Reports Mr. William Buisman, Plating Superintendent
to Mr. Ken Daly, Vice President and Gen. Mgr.
WESTERN AUTOMATIC SCREW COMPANY
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"The *right* combination . . . a Udylite Cyclemaster and Udylite's 66 Bright Nickel Process . . . that's our solution for faster, high quality plating."

Western Automatic Screw Company, one of the world's largest manufacturers of screw machine products, cold upset parts and Moen One-Handle Mixing Faucets has come to rely on Udylite's brand of trouble-free operation. The Udylite 66 Bright Nickel Process insures faster plating . . . with unexcelled brightness and leveling.

By combining this revolutionary bright nickel bath with the volume production characteristics of the Udylite Cyclemaster, they now enjoy high output with unusually low maintenance. As they put it, "We haven't gone near our Cyclemaster except for routine maintenance since it was installed and the quality of our plating work has been excellent."

For high volume plating . . . with the advantages of low cost operation and above-par quality, contact your local Udylite salesman. He can give you the facts for faster, finer metal finishing. Call him today, or write direct to:

the **udylite** corporation

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Don't throw away those epoxy-coated rejects

Here's a new paint stripper that will save them

Do you scrap perfect metal parts that have been imperfectly coated with epoxies, vinyls, polyesters and other hard-to-strip paints or lacquers?

In the last few months, users of Oakite Stripper S-A have eliminated many such losses. Here's what some of them say about it:

CALIFORNIA: An aircraft manufacturer tested many strippers on an epoxy designed to resist attack by hydraulic fluid. Finally found that Oakite Stripper S-A is "the only one that safely strips this paint from anodized aluminum."

NEW YORK: A camera maker coats flash bulb reflectors with black vinyl paint outside and aluminum paint inside. "Stripper S-A is the fastest ever used on our rejects."

OHIO: A maker of toy pistols had trouble stripping alternate coats of lacquer and metallized aluminum. Now "Stripper S-A does it amazingly fast and remetallizing is completely satisfactory."

CALIFORNIA: A producer of metal furniture uses Stripper S-A to remove clear epoxy from plated parts. Chemist says "This is the best stripper on the market."

ALABAMA: A hardware maker had trouble stripping lacquer from brass door knobs. Oakite Stripper S-A now does the work in "less than ⅓ the time taken by any other stripper."

NEW YORK: A manufacturer of business machines tested several strippers on various finishes on steel and aluminum. Verdict in favor of Stripper S-A was: "It's doing a wonderful job."

CONNECTICUT: A maker of brass lipstick shells has found that "Stripper S-A quickly strips epoxy lacquers from rejects and heavily coated work spindles."

CALIFORNIA: A missile maker reports that "Stripper S-A is doing a fine job stripping vinyl from stainless steel and titanium."

FREE Write Oakite Products, Inc., 40 Rector St., New York 6, N. Y., for complete information on Oakite Stripper S-A.

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Leading deburring company writes in:

To us, TUMBLEX* "T" abrasive is literally a "Touch of Gold"

Describing one of the revolutionary Norton barrel finishing abrasives, this customer continues:

We formerly were stocking four types of finishing media. By switching to ALUNDUM TUMBLEX *"T" abrasive we have eliminated three types and are getting better results. For example, one particular metal part required six hand operations prior to barrel finishing. Now, with your abrasive triangles, barrel finishing is all that's needed.*

Made of bonded ALUNDUM* abrasive, TUMBLEX "T" has a triangular, non-wedging shape that's excellent for finishing intricate-shaped parts . . . provides long, even wear . . . assures fine, uniform finish, short time cycles and big savings in finishing costs.

Other Norton top-performing barrel finishing abrasives include ALUNDUM TUMBLEX "A" abrasive, for general usage; ALUNDUM TUMBLEX "S" abrasive spheres that get into hard-to-reach areas; and TUMBLEX "N" abrasive, natural stones for producing highest lustre on various parts.

Send samples of parts, any sizes or shapes, to our Sample Processing Department. We'll barrel finish, return samples and report the methods and abrasives you need. Or, when you're in this area, come in and look things over, personally.

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Introducing Allied's

IRILAC™ #1000

New Clear Protective Coating for All Metals . . . as safe and easy to handle as Water!

New method of protection incorporates corrosion inhibitors in a water-soluble polymer base. Dries to an extremely thin, tough, durable coating—clear in color. Does not chemically affect base metal or any post-treatments. Used as a protective treatment alone or to enhance value of post-treatments.

Allied's new Irilac #1000 is a concentrated solution of a water-soluble polymer with built-in complex corrosion inhibiting materials. It was developed to answer the needs of the metalworking industry for a non-conversion process that will provide corrosion resistance and resistance to fingerprinting and abrasion on base metals and electrochemically or chemically finished surfaces—without changing the appearance of the metallic surface.

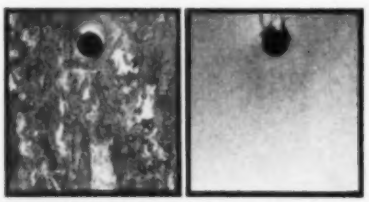
There are no hazards involved—Irilac is non-fuming, non-toxic, and requires no special fire prevention measures.

THE PROCESS

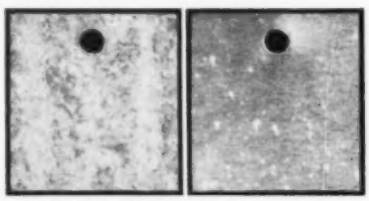
Irilac #1000 is diluted with water to provide a simple one-pass working solution. It is then applied by dip, brush or spray and forms a coating that quickly *bonds* to the metal surface without reacting with the surface.

THE PROPERTIES

The resulting coating is clear, transparent, thin yet durable. It has excellent water-resistant properties, and can be rubbed, handled and subjected to rough treatment. The surface to which Irilac has been applied is not altered—in fact, the transparent coating brings full tone to colored surfaces and clarity to iridescent surfaces. The water-thin physical characteristic of the solution means that the coating provides protection in recessed areas that are difficult, if not impossible, to protect with other methods.



STEEL PANELS: bare (left) and coated with Irilac (right) after 8-hour salt spray.



ALUMINUM PANELS: bare (left) and coated with Irilac (right) after 168-hour salt spray.

WHERE IRILAC CAN BE USED

Irilac #1000 can be applied to *any* metal—wet or dry—treated or untreated. All metals can be processed in *one* operation in the same solution. It can be applied in conjunction with any process—over Iridite, anodized, phosphated surfaces, black oxide, etc. Surfaces treated with Irilac provide a good base for paint.

APPLICATION ADVANTAGES

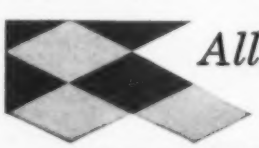
No other process or material available for the protection of metals offers all the application advantages found in new Irilac #1000:

1. It can be applied to *any* clean metal simply by dip, brush or spray. No special equipment is required.
2. Saves time—just apply and dry—no reaction time required.
3. No hazards involved—no exhaust or special fire protection equipment is required. Irilac is non-fuming and non-toxic.
4. Saves space. Presents no disposal problem. Low in first and final costs.

Because of its versatility and complete safety, Irilac has unlimited uses. For example, it will protect aluminum furniture, brass hardware and fixtures, steel parts of all types, zinc castings, etc. In fact, any base metal or plated surface, or those treated with electrolytic or chemical post-treatments, can be improved or enhanced with Irilac.

IRILAC #1000 MAY BE THE ANSWER TO YOUR PROTECTION PROBLEM

Our development staff will be glad to work with you to determine the significant benefits Irilac can offer you. Simply send us some parts and let us show you what Irilac can do. No obligation, of course.



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By
WILLIAM TUCKER
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Rochester, N.Y.

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79. ANODIZING

a. *TITANIUM – TIPPED ANODIZING WORK RACKS REQUIRE NO STRIPPING.*
Products Finishing, May 1958, pp. 74–78.

80. CLEANING

a. *DETERGENTS FOR ULTRASONIC CLEANING.*
Samuel S. Frey.
Ultrasonic News, May–June 1958, pp. 8–10.

81. CORROSION

a. *REACTION OF CERTAIN CHLORINATED HYDROCARBONS WITH ALUMINUM.*
A. C. Hamstead, G. B. Elder and J. C. Canterbury.
Corrosion, April 1958, *14*, No. 4, pp. 43–44.

b. *CORROSION OF ZINC BY DIFFERENTIAL AERATION.*
G. Bianchi.
Corrosion, May 1958, *14*, No. 5, pp. 55–58.

c. *HOW THE 200 SERIES COMPARES WITH 18-8 STAINLESS STEEL.*
George A. Sands and M. B. Keady.
Materials in Design Engineering, April 1958, *47*, No. 4, pp. 120–123.

82. ETCHING

a. *NEW PROCESS FOR REGENERATING COPPER ETCH BATHS.*
The Iron Age, May 22, 1958, *181*, No. 21, p. 138.

83. MISCELLANEOUS

a. *PROTECTING METALS AT HIGH TEMPERATURES.*
Alfred F. Hofstatter.
Materials in Design Engineering, April 1958, *47*, No. 4, pp. 115–119.

b. *SUCCESSFUL ULTRASONIC METAL FINISHING ASSURED BY UNDERSTANDING BASIC GROUND RULES.*
Paul M. Platzman.
Ultrasonic News, May–June 1958, pp. 14–16.

84. NICKEL

a. *ELECTROFORMS FEATURE NEW TYPE OF NICKEL.*
The Iron Age, May 1, 1958, *181*, No. 18, p. 92.

85. ORGANIC

a. *SCIENCE FOR THE COATINGS TECHNOLOGIST. PART IX. METALLIC PIGMENTS.*
E. S. Beck.
Metal Finishing, May 1958, *56*, No. 5, pp. 89–92.

b. *HOW TO APPLY PLASTISOLS BY THE DIP-COAT METHOD.*
Products Finishing, May 1958, pp. 69–72.

86. PHOSPHATING

a. *PHOSPHATING TREATMENTS. A COMPREHENSIVE PATENT LITERATURE SURVEY. PART II.*
Metal Finishing, May 1958, *56*, No. 5, pp. 97–100.

87. PURIFICATION

a. *A TECHNIQUE FOR PURIFYING ELECTROLYTIC SOLUTIONS.*
D. A. Vermilyea.
Journal of the Electrochemical Society, May 1958, *105*, No. 5, pp. 286–287.

88. STRESS

a. *FACTORS AFFECTING RESIDUAL STRESS IN ELECTRODEPOSITED METALS. A CRITICAL EVALUATION.*
Joseph B. Kushner.
Metal Finishing, May 1958, *56*, No. 5, pp. 82–87.

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National Association of Corrosion Engineers
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Iron Age
Chestnut & 56th St.
Philadelphia 39, Pa.

J. Electrochemical Society
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New York 23, N. Y.

Materials in Design Engineering
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New York 22, N. Y.

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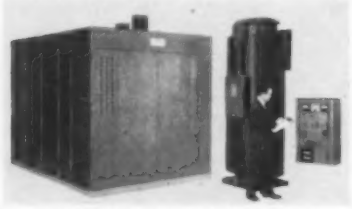

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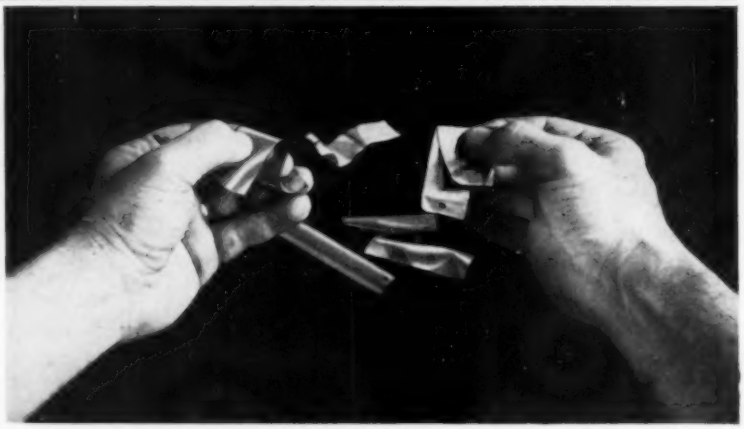

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DEVELOPMENTS

IN

DECORATIVE PLATING†

by CLARENCE H. SAMPLE‡

I. INTRODUCTION

During the past few years one seemed to encounter, with increasing frequency, statements to the effect that "nowadays the decorative plating on automobiles just isn't as good as it used to be." Such expressions arise not only from laymen but also from finishing engineers who have experience, responsibilities and special knowledge in this particular field. Observations of the behavior (or perhaps more appropriately misbehavior) of decorative platings on models as recent as 1956 and 1957 lend much support to these views.

Until rather recently the blame for this poor performance of decorative plating was placed, and in some instances quite justifiably, on the seemingly unending nickel shortage. Currently however, the situation is changing rapidly and it is most unlikely that an inadequate supply of nickel is responsible for poor quality decorative coatings produced recently. It has, of course, been realized or at least suspected by many platers that insufficient nickel to meet minimum thickness requirements was not the sole reason for the erratic and sometimes poor quality of the coatings they were producing.

From the above remarks one might conclude that there has been little or no progress in the field of decorative plating in recent years. Such is by no means the case. Even the frank realization by the industry that current decorative finishes are not all they should be is a development of some significance. It has already stimulated greatly increased research effort to develop decorative plating of better durability.

The purpose of this paper is to review briefly the principal developments in decorative metallic finishes since World War I and especially to emphasize recent observations and experience which seem to point the way to the production of coatings with improved performance and durability.

II. EARLY DEVELOPMENTS IN DECORATIVE PLATING

Unquestionably the most important single milestone on the road to the development of modern decorative metallic finishes was the invention of bright chromium plating[1]. With this development, it became possible to apply, at modest cost, bright, attractive and durable metallic finishes to steel and other inexpensive basis metals. As a result of much experimenting, testing and practical experience, it eventually became evident that the optimum decorative finish from the standpoints of both durability and cost should consist of an extremely thin layer of chromium (about 0.00002 in.) applied over a much thicker base plate of nickel or combination of copper plus nickel. In such a finish the chromium serves primarily to provide a non-tarnishing mirror-bright, bluish-white surface on the finished part. The thicker base plate serves a dual function: namely, (a) to provide a corrosion resistant, smooth, bright surface on which the bright chromium can be deposited, and (b) to protect the basis metal from corrosion. The optimum thickness of the base plate will vary, depending upon the nature of the basis metal, the environment to which the finished part will be exposed, and the service life expected.

Prior to the advent of chromium plating, practical decorative plating was relatively limited in applications and confined to copper, nickel and silver. All three of these metals, while capable of protecting iron and steel from rusting, suffer the serious handicap of themselves tarnishing when exposed to the air. Chromium, on the other hand, is practically immune to tarnishing even in the most contaminated atmospheres. In addition its high hardness

† Paper presented at the Society of Automotive Engineers Annual Meeting, Detroit, Michigan, January 17, 1958.

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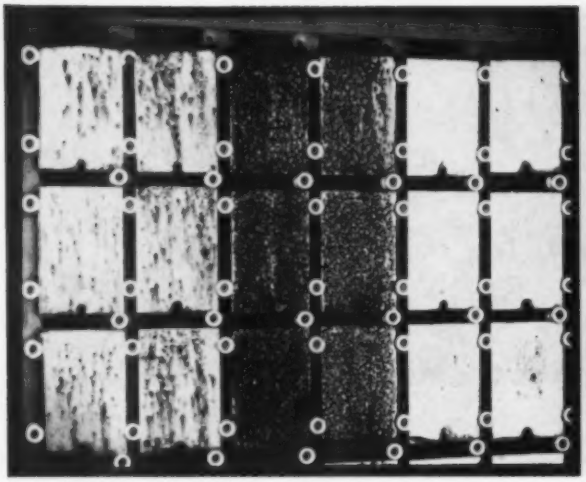

Fig. 1 1.0 Mil-Thick Coatings of ASTM, B-8, Program No. 1 after 3-year exposure at Kure Beach.

Column	Lot	
1	1	1.0 mil buffed dull nickel.
2	2	0.1 mil cyanide Cu + 0.9 mil buffed dull Ni.
3	3	0.1 mil cyanide Cu + 0.4 mil acid Cu + 0.5 mil buffed dull Ni.
4	4	0.1 mil cyanide Cu + 0.4 mil buffed acid Cu + 0.5 mil buffed dull Ni.
5	4NA	0.5 mil buffed dull Ni + 0.5 mil buffed dull Ni.
6	4B	0.5 mil annealed & buffed dull Ni + 0.5 mil buffed dull Ni.

All panels have final layer of chromium 0.01 mil thick. Reproduced with permission of the American Society for Testing Materials from: ASTM Special Publication No. 197.

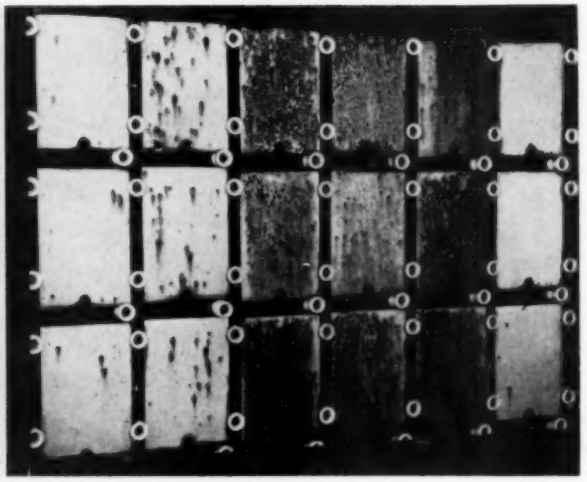

Fig. 2 1.5 Mil-Thick Coatings of ASTM, B-8, Program No. 1 after 3-year exposure at Kure Beach.

Column	Lot	
1	5	1.5 mil buffed dull Ni.
2	6	0.1 mil cyanide Cu + 1.4 mil buffed dull Ni.
3	7	0.1 mil cyanide Cu + 0.4 mil acid Cu + 1 mil buffed dull Ni.
4	8X	0.1 mil cyanide Cu + 0.9 mil acid Cu + 0.5 mil buffed dull Ni.
5	9	0.1 mil cyanide Cu + 0.9 mil buffed acid Cu + 0.5 mil buffed dull Ni.
6	9NA	1.0 mil buffed dull Ni + 0.5 mil buffed dull Ni.

All panels have final layer of chromium 0.01 mil thick. Reproduced with permission of the American Society for Testing Materials from: ASTM Special Publication No. 197.

offers excellent resistance to scratching, wear and abrasion. Thus in contrast to the polished brass and the nickel plated radiator shells of early automobiles, good chromium plated "bright work" on modern cars requires little or no care for maintenance of its attractive appearance over prolonged periods.

Early efforts to apply chromium coatings over base plates of copper, nickel, etc., soon revealed that the then current concepts of satisfactory basis metal cleaning and plating techniques were inadequate. The inherent tensile stresses in bright chromium deposits were sufficient to dislodge poorly adherent base plates of copper and nickel. Thus the improvement of basis-metal cleaning and preplating procedures, sufficient to withstand subsequent application of decorative chromium plating, was of itself, a development of importance.

Any resume of important developments in decorative plating would be incomplete without mention of the Watts nickel bath. This development by Professor Oliver P. Watts of the University of Wisconsin in 1916[2] marked the beginning of high speed commercial plating. With various modifications it constitutes the basis of most present day high speed nickel plating solutions. While with slight modifications it is still used extensively for applying relatively heavy, industrial-type nickel coatings, it has been almost completely superseded by proprietary bright and semi-bright processes for decorative plating.

Outstanding among the several early and able efforts to evaluate the durability of various decorative coating systems is the work of Blum and his colleagues at the National Bureau of Standards[3]. The results of this work, together with the practical experience gained in the automobile and plumbing fixture fields to which durable decorative metallic finishes were of especial importance, culminated in the first ASTM–AES specifications for decorative plating in 1935.[4] This achievement was also an important milestone in the development of decorative plating. With it the old art of electroplating became recognized as a controllable process capable of fulfilling an important engineering function.

The heaviest coating type in the first ASTM–AES Specifications for decorative plating on steel, called for total base-plate thickness under the chromium of 0.75 mil[4]. The beneficial effects of increased base-plate thickness on the durability of such coatings were soon recognized. As a result the minimum thickness of the heaviest coating class was progressively increased to 1.25 mils in 1940 and to 2.0 mils in 1945 where it remains at the present time[5]. While there have been no increases since 1945, some manufacturers currently specify thicker base plates, when higher quality and improved durability are required.

III. LATER DEVELOPMENTS IN DECORATIVE PLATING

Bright and Semi-Bright Plating Baths

Decorative plating today is almost wholly accomplished with bright or semi-bright nickel deposits from proprietary solutions, serving as the base plate for the chromium. While the first commercial bright nickel plating bath is attributed to Schlötter, in 1934[6], intensive research to develop improved processes has continued up to the present time. It is still continuing with perhaps even greater intensity because of

the dire need to improve the corrosion resistance of chromium plated deposits from present day commercial bright nickel solutions.

The development of nickel plating processes from which fully-bright deposits are directly obtainable without buffing probably should rank in importance with the development of bright chromium plating in the field of decorative plating. Certainly such processes are a boon to the production superintendent of the finishing department. By eliminating the need for buffing the nickel, that always troublesome and costly operation was eliminated. In addition, other advantages were effected, such as eliminatlng the danger of cutting through the nickel plate during buffing as well as avoiding the loss of nickel in the buffing operation itself, thereby leaving the total thickness deposited to perform its function of preventing corrosion of the basis metal.

In this same category, the development of semi-bright plating solutions should be mentioned. While the deposits from such solutions must be buffed to obtain a mirror-like luster, the effort required is small compared with that necessary to buff ordinary gray nickel to the same luster. Further, nickel deposits from some proprietary semi-bright baths exhibit a high degree of leveling or smoothing of the surface thus eliminating the need for polishing the basis metal to a uniform, smooth finish prior to nickel plating.

More recently, proprietary plating solutions have been announced which combine the leveling feature with full brightness of the deposit. Nickel deposits from such solutions have found favor in industrial applications where smooth, corrosion-resistant wearing surfaces are required, as well as in the field of decorative plating.

Plating Equipment and Tests for Quality Control

The design and manufacture of automatic cleaning and plating machinery has contributed greatly to the development of decorative plating. The use of such equipment, which usually includes means for continuous purification of the plating solution, makes possible the application of uniform coatings at high production rates and with a minimum amount of labor.

Likewise, the development of testing methods and devices for measuring and controlling such properties as thickness, stress, hardness, ductility and luster of electrodeposits have contributed much to the field of decorative plating. Further advancement along these lines is desirable and can be expected.

IV. DEVELOPMENTS RELATING TO THE CORROSION BEHAVIOR AND PROTECTIVE VALUE OF DECORATIVE PLATING

The results of the extensive atmospheric exposure tests by Blum et al., referred to earlier[3], clearly showed that the

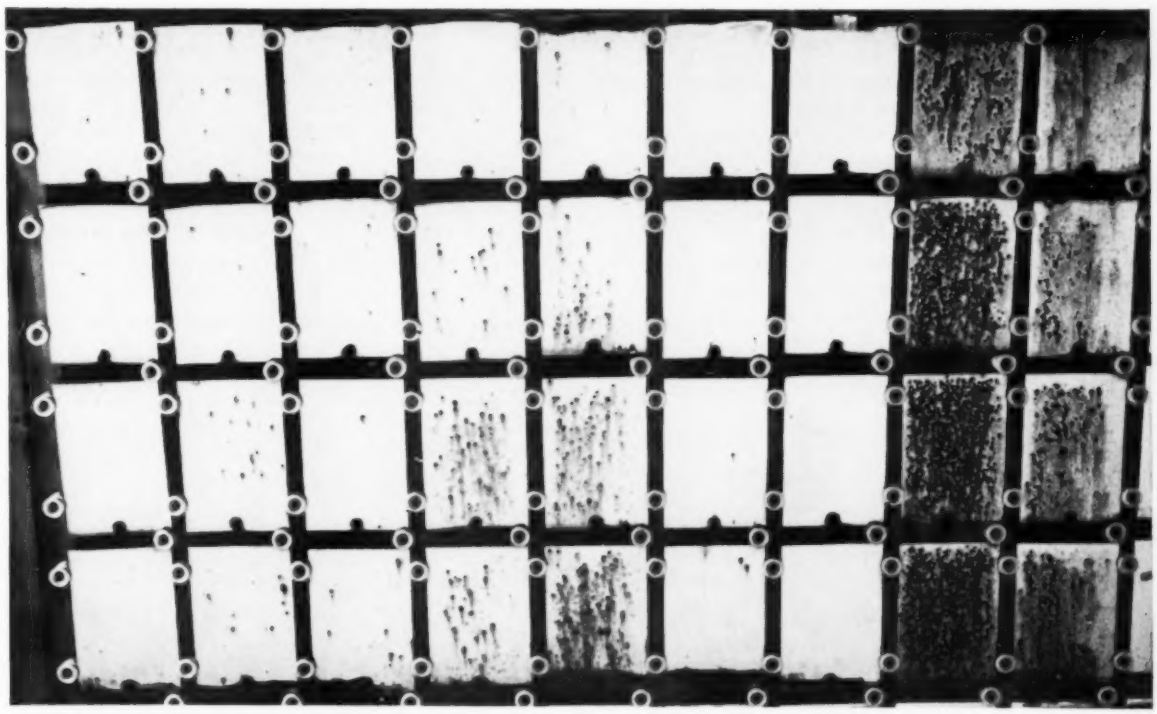

Fig. 3 2.0 mil-thick coatings of ASTM, B-8, Program No. 1 after 3-year exposure at Kure Beach.

Column	Lot	
1	10	2.0 mil buffed dull Ni.
2	11	0.1 mil cyanide Cu + 1.9 mil buffed dull Ni.
3	12	0.1 mil cyanide Cu + 0.4 mil acid Cu + 1.5 mil buffed dull Ni.
4	13	0.1 mil cyanide Cu + 0.9 mil acid Cu + 1.0 mil buffed dull Ni.
5	14	0.1 mil cyanide Cu + 0.9 mil acid (buffed) Cu + 1.0 mil buffed dull Ni.
6	14NA	1.0 mil buffed dull Ni + 1.0 mil buffed dull Ni.
7	14B	1.0 mil annealed and buffed dull Ni + 1.0 mil buffed dull Ni.
8	15	0.1 mil cyanide Cu + 1.4 mil acid Cu + 0.5 mil buffed dull Ni.
9	16	0.1 mil cyanide Cu + 1.4 mil buffed acid Cu + 0.5 mil buffed dull Ni.

All panels have final layer of chromium 0.01 mil thick. Reproduced with permission of the American Society for Testing Materials from: ASTM Special Publication No. 197.

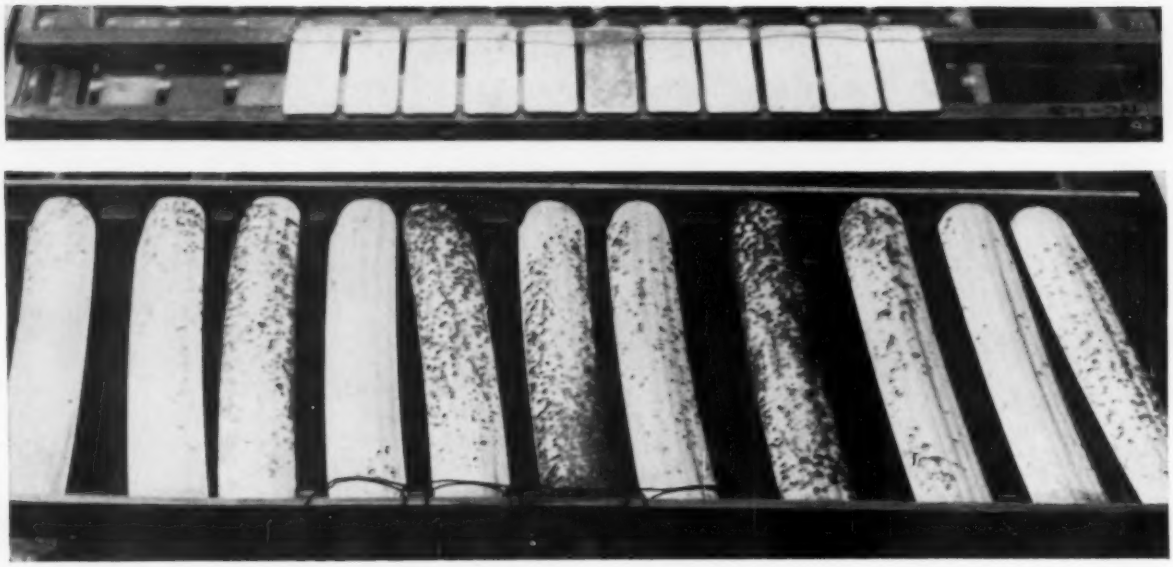

Fig. 4 AES Research Project 15 production test pieces after about 10 months exposure in the 800-foot test lot at Kure Beach. (Top Row) Copper-nickel-chromium plated zinc die castings. (Bottom Row) Nickel-chromium plated steel.

most important single factor affecting the protective value of decorative metallic finishes was the thickness of the nickel layer in the base plate underlying the chromium. This held true in all the several environments to which the test panels were exposed and for all the basis metals to which the various coating systems were applied.

Blum's findings were confirmed, insofar as a steel basis metal was concerned, in a subsequent exposure test program of ASTM Committee B-8[7]. In addition the results of the latter tests vividly demonstrated the superiority of all-nickel base plates compared with those consisting of the same total thickness of copper and nickel. The thickness of the nickel coating was the principal factor determining the protective value of the decorative coating system.

Included in the ASTM B-8 tests were a few sets of panels, the all-nickel base coatings of which were applied in two distinct layers. The first nickel layer was either buffed (to provide a direct comparison with the same thickness of buffed copper under nickel) or annealed and buffed prior to the application of the second nickel layer. These "double layer" nickel coatings in every total thickness category in which they were included (1.0, 1.5 and 2.0 mils) exhibited markedly superior performance in the marine and rural atmospheres to which they were exposed but relatively little benefit in

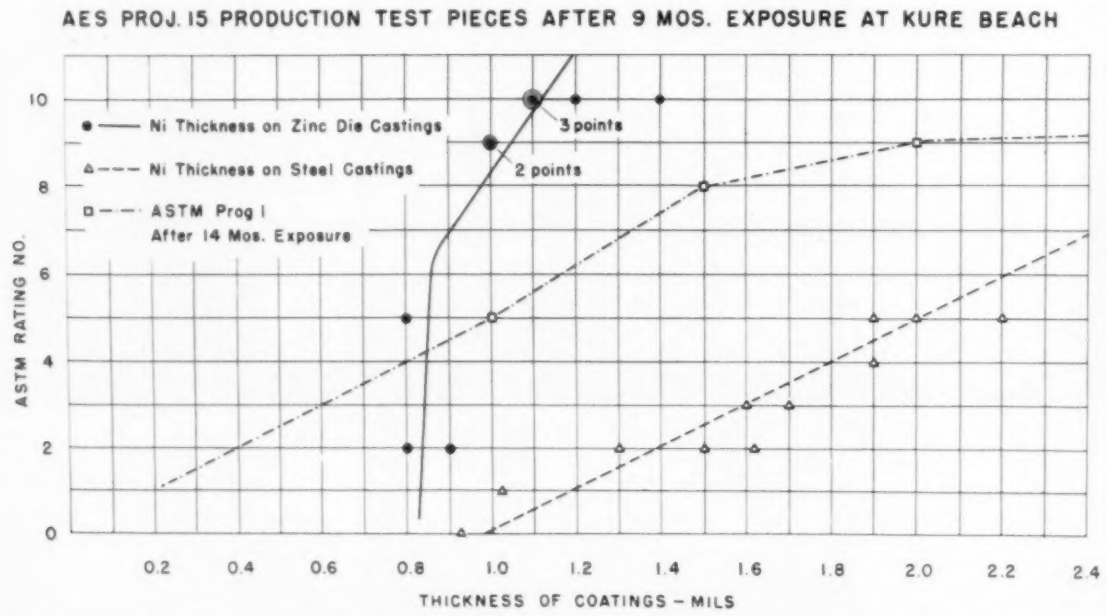

Fig. 5 Exposure test ratings (ASTM, B-8) versus measured thickness of nickel coatings on AES Project 15 production test pieces shown in Fig. 4.

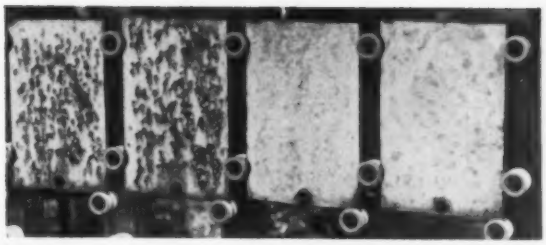

Fig. 6 Effect of chromium thickness on 1.5 mils bright nickel. ASTM B-8 program 4 panels after exposure of one year at Kure Beach. Panels left to right:

Lot No. 8, 0.005 mil regular chromium.
Lot No. 1, 0.01 mil regular chromium.
Lot No. 9, 0.03 mil regular chromium.
Lot No. 10, 0.06 mil regular chromium.

the industrial atmospheres. The effect at Kure Beach* of increasing the nickel thickness and of applying the nickel in two layers as well as the comparative protective value of nickel-chromium versus copper-nickel-chromium is illustrated in Figs. 1, 2, and 3.

This striking difference in effectiveness of the double-layer nickel coatings in the marine and rural versus the industrial atmospheres provides a possible clue not only to a means of directly improving the durability of decorative coatings but it also sheds light on the mechanism of their failure in different environments. In essence it would appear that, in pure marine and rural atmospheres, early failure of nickel-chromium and copper-nickel-chromium coatings results from existing porosity of some type, the exact nature or cause of which is not as yet known with certainty. In industrial atmospheres, on the other hand, early failure may occur not only as a result of existing pores, but also as a result of pinholes created by intense localized corrosion of the nickel and copper by the atmosphere. On this basis the superior behavior of the double-layer nickel coatings in the marine and rural atmospheres can be ascribed to their relative freedom from initial porosity which would not be effective in severe industrial environments due to the rapidity with which pinholes can be created from the outside in. A discussion of double-layer nickel coatings together with the results of a microscopic examination of some of the ASTM B-8, Program 1 test panels following their removal from the exposure racks at the conclusion of the tests, was given in a paper by McKay and Knapp presented at the Fall 1957 Meeting of the Electrochemical Society[5].

Continued interest in the improved performance of double layer nickel coatings has prompted Subcommittee IV of ASTM Committee B-8 to undertake the preparation of a Recommended Practice for the production of such coatings. In this connection it should also be noted that base plate coating combinations consisting of an initial layer of leveling-type semi-bright nickel followed by a layer of bright nickel have been developed. This results in a double-layer type nickel deposit which needs no buffing prior to chromium plating and is claimed to provide better corrosion protection to the basis metal than the same total thickness of a single layer of bright nickel.

Buffed Dull Nickel Versus Bright Nickel

It should be emphasized that the conclusions drawn from the two test programs noted above[3,7] are based upon the behavior of buffed, dull nickel. Subsequent tests of ASTM Committee B-8 and in particular its current Program No. 4 in which both bright and buffed dull nickel are included, indicate that there can be a vast difference in the durability of the two types of nickel deposits. While Program 4 is still in progress and no official conclusions have as yet been published by the Committee, inspection results after exposure of one year at Kure Beach indicate the chromium plated bright nickel included in these tests tends to be inconsistent in its corrosion behavior and is generally inferior in protective value to buffed dull nickel of the same thickness.

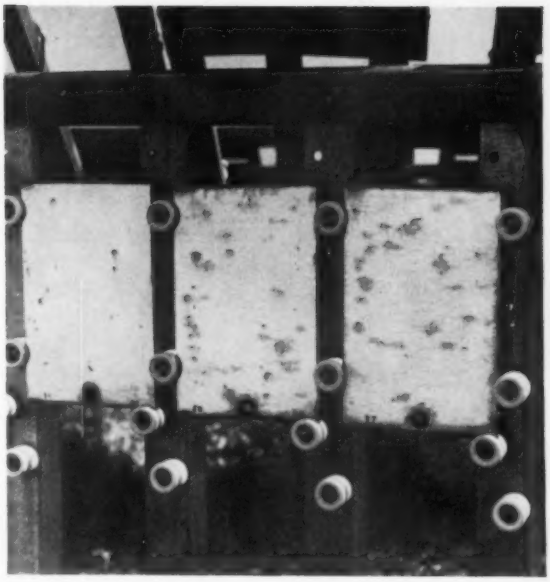

Fig. 7 Effect of chromium thickness on 1.5 mils buffed Watts nickel. ASTM B-8 Program 4 panels after exposure of one year at Kure Beach. Panels left to right.

Lot No. 15, 0.01 mil regular chromium
Lot No. 16, 0.03 mil regular chromium
Lot No. 17, 0.06 mil regular chromium

The variable and sometimes very poor corrosion behavior of chromium-plated bright nickel has been noted in other tests[3]. Also in this connection, the work of the AES Research Project 15 Committee has been hampered by the extreme variability in corrosion behavior of some plated test panels and production items used to evaluate the accelerated corrosion tests it has under consideration. In some instances it was deemed necessary, because of variable behavior, to test eleven presumably identical pieces in order to obtain a statistically significant result.

What is the reason for this observed erratic and in some instances extremely poor corrosion resistance of chromium plated bright nickel? In the case of the AES Project 15 production items considerable variation in thickness of the nickel was noted in two sets of eleven production pieces exposed for 10 months at Kure Beach. The condition of these pieces at the time they were removed from the racks for cross sectioning is shown in Fig. 4. The plot of rating number versus thickness, Fig. 5, shows a marked improvement in protective value with increasing nickel thickness. However, it will be noted that even the thicker coatings have given a rather poor account of themselves compared with the buffed dull nickel of ASTM B-8 Program 1. (Cf Fig. 4 with Figs. 1, 2 and 3 noting especially, the difference in

* Marine atmosphere exposure test lot of the International Nickel Co., Inc. at Kure Beach, North Carolina.

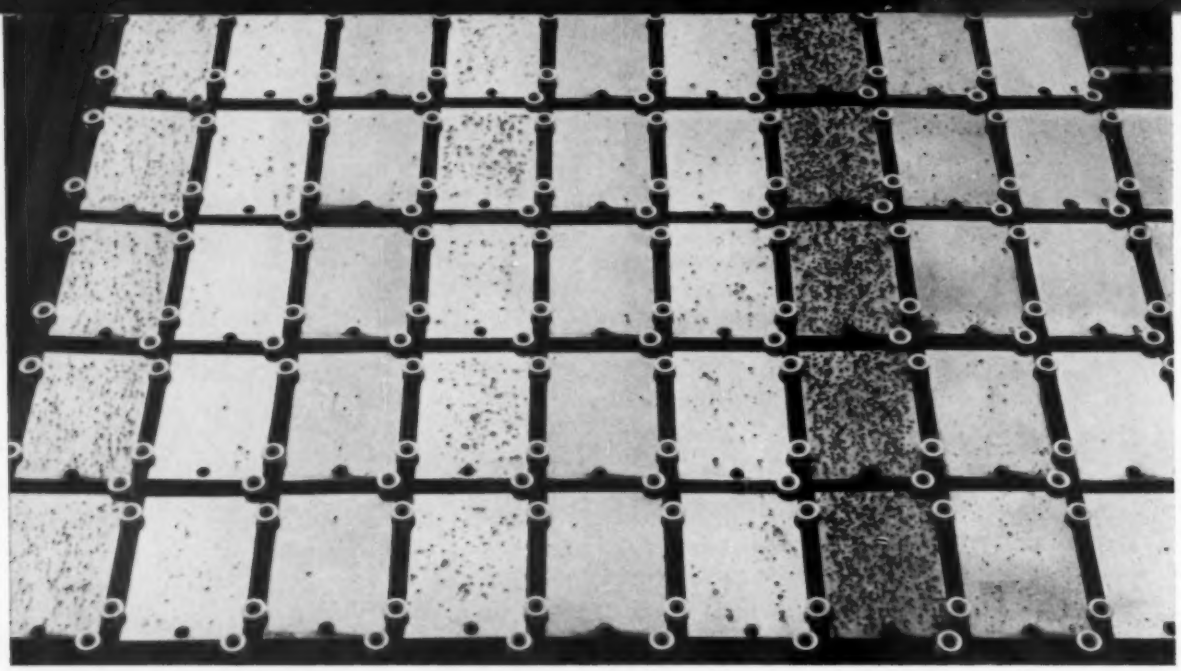

Fig. 8 1.5 mils bright and Watts nickels with and without 0.01 mil chromium after about 7 weeks exposure in 800-foot test lot at Kure Beach. Panels left to right:

Column		Column	
1	Duplex bright nickel	6	Bright nickel "B" plus 0.01 mil chromium
2	Duplex bright nickel plus 0.01 mil chromium	7	Watts nickel as plated
3	Bright nickel "A"	8	Watts nickel buffed
4	Bright nickel "A" plus 0.01 mil chromium	9	Watts nickel buffed plus 0.01 mil chromium
5	Bright nickel "B"		

exposure times.) The significance of the rating number is provided in Table I.

The one year inspection results for the ASTM B-8 Program 4 panels exposed at Kure Beach also indicate improved performance with increased nickel thickness. But, here again, the protective value of the thickest coatings (2.5 mils) is less than could be expected with buffed dull nickel. This suggests that minimum coating thickness specifications which were based on the performance of buffed dull nickel (eg. the present ASTM-AES Specifications) may be inadequate when bright nickel is used.

Another factor which may account in part at least for the difference in corrosion behavior of Watts nickel and organic type bright nickels is the general inclusion of small amounts of sulfur in the latter deposits. Working with various types and compositions of nickel foils Wesley and Knapp[12] have reported that 0.076 per cent sulfur in Watts type nickel foils 1.0 mil thick greatly accelerates perforation when exposed to marine and industrial atmospheres.

Effect of Chromium Plating

Communications with several investigators in the field of decorative plating have indicated that the chromium plating operation per se may have a profound effect on the durability of bright nickel-chromium coatings.

The effect of chromium thickness was included as a variable in the ASTM B-8 Program 4 referenced earlier. Inspection results after exposure of one year at Kure Beach show a marked improvement in protective value by increasing the chromium thickness from 0.01 mil to 0.06 mil when applied over 1.5 mils of bright nickel on steel. As might be expected, the 0.06 mil coatings of ordinary chromium show typical craze patterns to a considerable extent. Nevertheless, there is little if any rusting of the plated steel base. This is illustrated in Fig. 6. Fig. 7 shows the effect of chromium thickness on buffed Watts nickel for purposes of comparison.

Recent atmospheric exposure test results have been obtained which clearly show a pronounced adverse effect of chromium plating some bright nickel[10]. The nickel coatings were 1.5 mils thick and were applied directly to cold rolled low carbon steel. The chromium coatings were 0.01 mil thick and applied from the ordinary bath under customary conditions of operation.

The adverse effect of chromium plating the bright Nickels "A" and "B" is in sharp contrast with its beneficial effect on buffed dull nickel, as shown in Fig. 8. That such is the case is in a way, doubly tragic, since without the chromium the protective value of these bright nickels is superior to the unbuffed and in some instances the buffed Watts nickel included in the tests.

Why should chromium plating bright nickel have an adverse effect on its protective value when it has such a marked beneficial effect on buffed dull nickel?

It would appear that the adverse effect of chromium plating bright nickel may be related to the little understood but frequently encountered phenomena of hydrogenem brittlement and hydrogen cracking of susceptible materials. It is well known for example, that highly stressed high strength steel may be caused to crack spontaneously when hydrogen is electrolytically discharged onto the stressed surface. Similarly, thin-walled, hardened "K" Monel tubes have been known to crack spontaneously when chromium plated. In fact, hardened Monel under stress is susceptible to cracking when immersed in a chromium plating bath without being made the cathode. It is well recognized that the susceptibility of materials prone to hydrogen cracking increases with increasing stress and hardness.

It is reasonable then to suspect that a hard bright nickel coating perhaps containing unduly high internal stresses might be susceptible to spontaneous hydrogen cracking when chromium plated. The observation noted earlier that thicker than normal chromium coatings enhance the protective value

TABLE I

Significance of ASTM Committee B-8 Rating Numbers for Exposure Test Panels

Rating Number	Protective Value of coatings based upon presence and extent of basis metal corrosion products
10	Perfect—no evidence of basis metal corrosion.
9	Basis metal corrosion evident but no more than 0.10% of surface area affected.
8	0.10 to 0.25% of surface area affected.
7	0.25 to 0.50% of surface area affected.
6	0.50 to 1.0 % of surface area affected.
5	1.0 to 2.5 % of surface area affected.
4	2.5 to 5.0 % of surface area affected.
3	5.0 to 10.0 % of surface area affected.
2	10.0 to 25.0 % of surface area affected.
1	25.0 to 50.0 % of surface area affected.
0	50.0 to 100.0 % of surface area affected.

of bright nickel-plated steel tends to support the hypothesis of spontaneous cracking. If the nickel cracks during the first few seconds of chromium plating, it is reasonable to expect that those early cracks might be filled or bridged with chromium by the time say 0.06 mils has deposited, such as is well known to occur during the deposition of relatively thick industrial chromium coatings[11].

Summary and Conclusions

Important early highlights leading to the development of modern decorative plating are summarized below:

a) Announcement of the Watts bath which signalled the beginning of high speed nickel plating.
b) The invention of bright chromium plating.
c) Improved basis metal preparation and cleaning procedures to secure satisfactory adhesion of deposits.
d) The development of specifications for plated coatings including testing methods.
e) The invention of bright and semi-bright nickel-plating solutions.
f) The development of automatic cleaning and plating machines.

Relatively recent observations in respect to the durability of decorative plating may be summarized as follows:

a) "Double layer" buffed dull nickel chromium coatings provide much better protective value in marine and rural atmospheres than do single layer nickel-chromium coatings of the same total thickness.
b) The protective value of bright nickel coatings under bright chromium is generally inferior to buffed dull nickel of the same thickness when boldly exposed to the weather.
c) Increasing the thickness of bright nickel under chromium improves the protective value of the composite.
d) Chromium plating bright nickel may have an adverse effect on its protective value, however, increasing the thickness of the chromium from three to six times that normally applied has a marked beneficial effect.

While much of the foregoing presentation is in a sense a criticism of current bright nickel, it is well recognized that even more might be written regarding its merits. Obviously bright nickel plating can perform and is performing a very useful and most important function in the field of decorative plating. In many applications it is fulfilling its purpose not only without cause for complaint but with laudable merit. Further, despite its somewhat inferior protective value, (compared with buffed Watts nickel) in applications involving bold exposure to the elements, it is most unlikely that industry would be willing because of increased costs, to revert to buffing dull nickel as a base plate for chromium. Finally, with both the producer and the consumer interests cognizant of the need to improve the durability of decorative plating, the industry can confidently expect that through continued research efforts, such as are in progress in the AES Research Program, ASTM Committee B-8, and the laboratories of many private organizations notable advancements will be forthcoming.

REFERENCES

[1]Burns, R. M. and W. W. Bradley, "Protecting Coatings for Metals," 2nd Edition, ACS Monograph No. 129, p. 221, 1955, Reinhold Publishing Corp., New York City.

Gray, A. G., "Modern Electroplating," p. 135, 1953, John Wiley & Sons, Inc., New York City.

[2]Watts, O. P., Trans. Am. Electrochem. Soc., **29** 395, 1916.

[3]Blum, W., P. W. C. Strausser and A. J. Brenner, Research, Nat. Bur. Stds., **13** 331 (1934).

Blum, W., P. W. C. Stausser, J. Research, Nat. Bur. Stds., **24** 443, (1940).

[4]Proceedings, Am. Soc. Testing Matls., **34** 686, 1935

[5]ASTM Standards, 1955, Part 2, p. 793.

[6]Schlotter, M., U.S. Patent No. 1,972,693, September 4, 1934.

[7]"Report of Subcommittee II on Performance Tests," Proceedings, Am. Soc. Testing Matls., **51** 213 (1951).

[8]Paper not as yet published.

[9]Unpublished experiments by The International Nickel Company, Inc.

[10]Unpublished experiments by The International Nickel Company, Inc.

[11]Gray, A. G., "Modern Electroplating," p. 179, 1953, John Wiley & Sons, Inc., New York City.

[12]Wesley, W. A. and B. B. Knapp, Trans. Inst. Met. Finishing, **31** 267 (1954).

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CLEANING AND PREPARATION OF METALS PRIOR TO ELECTROPLATING:

Effect of Oxide Films

XI. EFFECT OF OXIDES ON THE ADHESION OF ELECTROPLATES

by DR. HENRY B. LINFORD† and DR. AMBATI VENKATESWARLU‡

Using the techniques developed by Linford and Feder in their study of nickel plating on oxidized copper, a study was made of the effect of oxide film thickness on the adhesion of the nickel plate. The modified Jacquet method was used to measure adhesion.

The principal deviation from the methods of the previous investigators was that, instead of plating for approximately twelve seconds, in this investigation a plating time of approximately one hour was used. It was found that original oxide film thicknesses up to a thickness of 1000 Å did not affect the adhesion of the nickel on copper. As the original oxide film thickness was increased up to 2500 Å, the adhesion decreased in a regular fashion. When oxide thicknesses exceed 4000 Å, the nickel plate peels spontaneously during drying.

INTRODUCTION

The American Electroplaters' Society's Research Project No. 12 has been studying the preparation of metal surfaces for electroplating. The inorganic soils most frequently encountered are oxide films and cleaner residues. The role that an oxide film can possibly play during the course of the plating operation is dependent on the system employed. For a particular system, a detailed study should be made as to (a) what happens to the oxide film if the cathode is not immersed under potential, and (b) what happens to the oxides during the plating period.

As a result of the chemical solution of oxide, basis metal ions will be present in the cathode film which may result in plated alloy layer at the interface. When the plating current is switched on, oxide will be electrochemically reduced. If this reduction continues after the deposit has covered the surface, reduced metal (from reduction of the oxide) will be physically trapped under the plate. In addition, unreacted oxide may remain at the interface. Any of these conditions could result in a decreased adhesion of the electroplate.

Linford and Feder[1, 2, 3] studied the first two aspects of the problem with reference to the electroplating of nickel on copper from a Watts nickel bath. During the course of their study, the following results were obtained:

1. When oxidized copper cathodes were allowed to soak in the Watts nickel bath prior to plating, even at high *p*H values, significant oxide dissolution occurred, producing a cathode film rich in copper ions.
2. These copper ions codeposited with the first layer of nickel, producing an initial layer of copper-nickel alloy.
3. Electrochemical reduction of copper oxide consumed a large share of the current under the conditions studied.[2] (A plating current, totaling 134 coulombs per square foot, was used.) In the case of the thinner films, ∠650 Å, at the start of plating (1000 Å before immersion in the plating bath),* all of the oxide present at the start of plating was reduced by this mechanism.

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*In the current study, the same plating cycle was used as that employed by Linford and Feder[2] except that the time of nickel plating was extended from 12 seconds to 1 hour. This cycle included a 4-minute soak in the plating bath prior to turning on the plating current. In these 4 minutes, Linford and Feder report that 350 Å of Cu_2O dissolve. This soak was necessitated by the experimental condition but it is recognized that this is not a condition to be encountered in practice; therefore, all oxide thicknesses, unless otherwise stated, are referred to those remaining after the 4-minute soak.

TABLE I

RESULTS OF WEIGHING IN THE DRY-BOX WITH A NITROGEN ATMOSPHERE

Run No.	Time in min.	Weight (grams)	Difference in Weight (micrograms)	
1	0 (1st weighing took place after 30 min.)	3.756369	0	
	42	3.756369	0	
	81	3.756376	+7	
2	0 (1st weighing after 14 min.)	4.114326	0	
	36	4.114323	−3	
	75	4.114327	+1	
	123	4.114333	+7	
	170	4.114331	+5	
4	0 (1st weighing after 7 min.)	4.250395	0	
	21	4.250381	−14	Weight decrease due to some static charge. No grease is found on the sample.
	43	4.250385	−10	
	74	4.250385	−10	
	111	4.250391	−4	
	148	4.250388	−7	
	213	4.250385	−7	

TABLE II

CONDITIONS FOR VARIOUS VACUUM TREATMENTS OF COPPER SPECIMENS

Treatment	Pressure (mm Hg)	Temperature (°C)	Time, Min.
1. Outgassing, before H_2 reduction	$<5 \times 10^{-5}$	600	Variable
2. Hydrogen reduction	1 mm	600	49–90
3. Outgassing after H_2 reduction	$2–5 \times 10^{-5}$	600	Variable
Ultimate vacuum	3×10^{-7}–to 1×10^{-6}	30	
4. Outgassing before oxidation	$<6 \times 10^{-6}$	73, 76, 108, 130, 135, 136, 140, 142, 153, 167, 174, 177, 180, 192, 222.	Variable
5. Oxidation	≃1 mm	73, 76, 108, 130, 135, 136, 140, 142, 153, 167, 174, 177, 180, 192, 222.	30
6. Outgassing after oxidation	6×10^{-6}	73, 76, 108, 130, 135, 136, 140, 142, 153, 167, 174, 177, 180, 192, 222.	Variable
Ultimate Vacuum	3×10^{-7}–to 2×10^{-6}	30	

4. Under the circumstances investigated, there appeared to be little doubt that where oxide films thicker than 650 Å are present at the start of plating (1000 Å before immersion in the plating bath), appreciable quantities of oxide remained on the specimen after plating (presumably under the nickel plate), the amount increasing with increasing original thickness of the oxide film.

A study of the possible relationship between the oxide thickness and the adhesion was undertaken in order to work out some broad tolerance limits of oxide thickness for the platers' guidance.

EXPERIMENTAL PROCEDURE

Since necessary data were already available,[3] the system—plating nickel on copper—was chosen for this study.

Equipment for Controlled Oxidation and Plating:

The equipment used to produce specimens with known amounts of oxide, and to plate the original layer of nickel was described in detail by Linford and Feder,[2] except that for the present investigation water pumped nitrogen was used in the dry-box instead of helium since it reduced the expenditure involved in maintaining the inert atmosphere for two reasons:

1. The leak rate of nitrogen was considerably less than that of helium due to the higher molecular weight.
2. The cost per cubic foot of helium was about two and a half times that of nitrogen.

The pump proved adequate to circulate the nitrogen at the desired circulation rate of 10 cubic feet per minute. To avoid introduction of moist nitrogen, the gas was passed through a drying unit (employing Molecular Sieve)* before being introduced into the dry-box. A quantitative study was made to estimate the oxygen pick-up in the dry-box by taking a clean sample of copper, deoxidizing it and weighing it at successive periods. The results are tabulated in Table I. Upon examination of the data,

*Linde Air Products, Tonowanda, New York

it was decided that a nitrogen atmosphere could be safely substituted for the helium previously used.

1. Preparation of the Specimens:

A copper tube, 7/8 in. in diameter, 5 in. long and weighing approximately 24 g (0.85 oz)* was degreased by soaking in trichlorethylene followed by acetone for about half an hour in each solvent. It was then rinsed in running tap water and etched electrolytically in acid-copper sulfate (10 per cent copper sulfate, 1 per cent sulfuric acid) to approximately 5 g (0.18 oz) (about 0.003 in. thick), after which it was cut to a length of 3½ in. The final size and weight of the sample were determined by the sensitivity limits of the microbalance. The roughness measured on a Profilometer** was 20–30 rms in microinches (axial), and 30–50 rms in microinches (circumferential).

The sample was again degreased in trichlorethylene, rinsed in tap water, boiled in 5 per cent hydrogen peroxide for 15 minutes followed by treatment with concentrated ammonium hydroxide and rinsed. It was then dipped in 2 per cent hydrochloric acid solution and thoroughly rinsed in distilled water. At this stage, it passed the atomizer test for cleanliness. The sample was air-dried and stored in a clean glass tube, sealed with ungreased, standard taper, ground joint cap, for subsequent transfer into the dry-box. The roughness after cleaning was the same as before cleaning.

2. Reduction of the Sample:

The sample was introduced into the vacuum system and baked for half an hour at 500 to 600C. After this degassing, hydrogen was admitted to reduce surface oxides. This reduction was carried out at 500 to 600C and 1 mm pressure for 15 minutes, after which period the system was evacuated. This cycle was repeated three times to insure maximum surface oxide reduction. Finally, the vacuum furnace was cooled and dry-box atmosphere admitted. The sample was transferred to the microbalance and weighed.

*Courtesy American Brass Co., Waterbury, Connecticut

**Model DAC, diamond stylus 0.0005 in. tip radius, Physicists Research Co., Ann Arbor, Michigan.

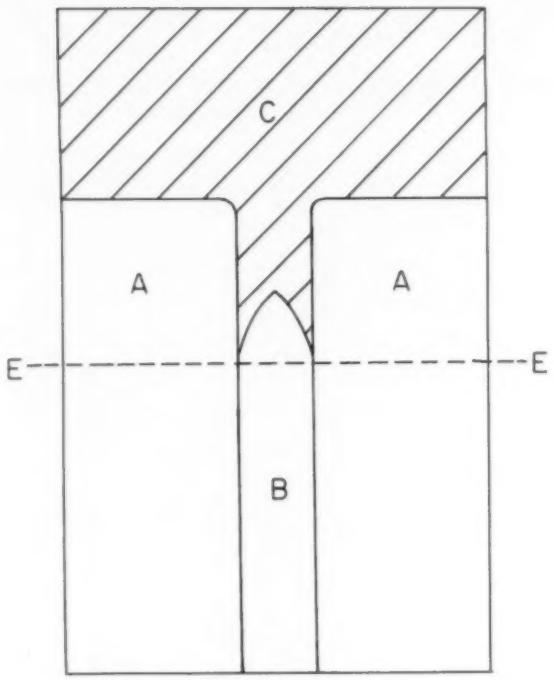

Fig. 1. Cathodes as prepared for adhesion testing

3. Oxidation of the Sample:

The sample was returned to the vacuum system and heated to the desired temperature. Oxygen was admitted and allowed to react for 30 minutes in each case. The oxygen picked up by the sample is dependent on the pressure, temperature, roughness, and the degree of cleanliness of the surface. By suitable manipulation of the operating conditions, seventeen samples were oxidized with varying amounts of oxygen pick-up. An oxide film formed as in these experiments is not uniform in thickness. Since thickness reported in units of distance such as Å* is easier to comprehend than when reported as weight per unit area,** throughout this paper the thicknesses will be reported as Å calculated from the original data, μg of oxygen per sample (19.25 in.² area), assuming the film to be Cu_2O and uniform in thickness. After the thirty-minute period of oxidation, the system was evacuated, the furnace cooled and the system further evacuated to 10^{-7} mm of mercury pressure. Then the vacuum was broken by admission of dry-box atmosphere, the sample was transferred to the microbalance and weighed, thus giving the weight of oxygen gained by the sample. The details of the various vacuum treatments are presented in Table II.

*1 Å = 3.94 × 10⁻⁹ inches

**A uniform film of Cu_2O 1 Å thick is equivalent to 3.9 × 10⁻⁴ milligrams of Cu_2O per square inch of surface.

4. Plating:

The *p*H of the Watts nickel bath was maintained constant at 5.2–5.3 throughout all of this work since the mechanism of electroplating nickel on copper surfaces soiled by oxides was studied previously by Linford and Feder[3] at this *p*H. The weighed sample was placed in the plating bath. The nickel solution was admitted under a slight vacuum and the sample allowed to soak for 4 minutes (a further condition imposed, Linford and Feder).[3] These conditions were maintained constant throughout this present work, as it was thought that a study of adhesion tests under identical conditions with those employed by Linford and Feder[3] would throw more

TABLE III

OXYGEN PICK-UP VERSUS ADHESION

Serial No.	Temp. of Oxidation °C	Oxygen Pick-Up μg	Thickness of Cu_2O Film Å[1]	Cu_2O Left Under Plate in Å[2]	Width of Strip in mm	Force to Detach lbs	Force to Detach Strip 0.5 in. Wide calc.
1	—	0	nil	0	5	>300[3]	>762
2	73	128	154	0	5	>284[3]	>721
3	76	98	118	0	5	>160[4]	>406
4	108	283	340	0	7	>300[4]	>454
5	108	245	294	0	7	>300[3]	>454
6	136 (20 min)	496	595	0	7	>300[3]	>454
7	130	602	722	0	7	>300[3]	>454
8	135	893	1072	144	8	120	191
9	140	920	1104	168	7	160	290
10	136	1009	1211	216	9	203	287
11	142	1083	1300	288	8	159	253
12	153	1525	1830	684	8.5	96	144
13	167	1830	2196	1020	7	145	263
14	174	2444	2933	1680	8.5	<5	<9
15	180	2975	3570	2280	10	<5	<9
16[5]	177	3242	3890	2544	—	0	0
17[5]	192	3863	4636	3204	—	0	0
18[5]	222	4574	5489	3960	—	0	0

[1]Before immersion in the plating bath.
[2]Calculated from reference,[3] Fig. 4.
[3]Maximum capacity of the machine was 300 lb. However, at this force the copper basis metal tore; thus, no narrower strip was used since the strength of the copper basis metal was exceeded.
[4]Backing copper insufficient, resulting in torn strip.
[5]In the case of these runs, the nickel plate does not adhere to the basis copper metal. During the process of vacuum drying the sample, the nickel plate came off. On visual observation, it was found that the oxide film remained on the basis copper metal.

light on the mechanism they developed. After the soak period, plating was performed on the outer surface of the sample for a period of 1 hour at a current density of 9.3 amp/sq. ft. at room temperature. This gave a nickel plate thickness of ½ mil which was suitable for testing adhesion by the Jacquet method.

After the plating period was over, the solution was drained, the sample rinsed three times with distilled water agitated by nitrogen gas, and then dried under vacuum for half an hour.

5. Adhesion Testing by Modified Jacquet Method[4]:

The nickel-plated copper tube was removed from the dry-box, slit lengthwise and flattened. It is recognized that a stress is applied to the bond by opening the cylinder. Since in the cases of thinner films it was found that the bond was stronger than the basis copper it was concluded that introducing this stress did not invalidate the results. The test strip, B, (see Fig. 1) was outlined by scribing on the side which had received the nickel deposit.

The plate was then cleaned in boiling alkaline cleaning solution,[6] washed in running tap water followed by immersion in 1 per cent hydrochloric acid solution with subsequent rinsing in distilled water. Plates cleaned using this procedure passed the atomizer test.[6] Next, the cross-hatched portion C was painted with Aqua Dag* to prevent adhesion, and dried in an oven at a temperature between 75–100C. The portions marked A were masked by platers' masking tape. Care was used to avoid soiling test strip B.

The plate was dipped in dilute hydrochloric acid (1 per cent) up to EE to dissolve surface oxides formed by atmospheric oxidation. Portion B was then plated in Woods' nickel strike[7] (340 g/l (45 oz/gal) nickel chloride, 125 ml/l (17 oz/gal) concentrated HCl for one minute at room temperature at a current density of 50 amp/sq ft, to insure good adhesion of the subsequent copper plate.

*Acheson Colloids Corp., Port Huron, Mich.

The portion below EE was then rinsed with distilled water and the whole plate was immersed into acid-copper sulfate bath (composition $CuSO_4 \cdot 5H_2O$: 188 g/l (25 oz/gal), H_2SO_4 (conc.): 74 gm/l (10 oz/gal)) and copper plated at a temperature of 50C and at a current density of 18.6 amp/sq ft for a period of 90 hours; thus, building up a strip thickness of 80 mils. The temperature of the copper bath was maintained constant at 50C. Cathode bar agitation was employed. Two anodes were used —one on either side of the cathode (test specimen)—so that the plating on the back of the test piece formed a good support to withstand the adhesion testing.

After the plating was finished in the copper bath, the specimen was removed and cut to size to fit into a clamp (see Fig. 2) designed for the purpose of holding it in a tensile testing machine.** The portion of the plate (area C, Fig. 1) was bent to a 90° angle and gripped by the jaws of the machine.

**The machine used was a Scott Tester, Model No. DH, manufactured by the Henry L. Scott Co., Providence, Rhode Island.

The results of tests performed with different amounts of oxides on the sample are presented in tabulated form (see Table III).

RESULTS AND DISCUSSION OF RESULTS

The results indicate that oxide films up to a thickness of about 650 Å, present at the start of plating (1000 Å before immersion in the plating bath),* have no measurable effect on adhesion. Linford and Feder[3] showed that in the case of films below a thickness of about 350 Å the film completely dissolved during the soak period and in the plating period the copper ions from the adjacent cathode film codeposited with the nickel. Our results indicate no change in adhesion as a result of this alloy plate.

With films (before immersion in the plating bath) in the range of 350 Å to 1000 Å, it was found by Linford and Feder[3] that the combined processes of oxide dissolution during the preplating period and the oxide reduction during the plating period would remove all the oxide present at the surface, and the plated specimen would then be oxide-free. The tests on adhesion corroborate this finding inasmuch as with films up to about 1000 Å (before immersion in the plating bath) the adhesion remained steadily beyond the tearing strength of the copper basis metal. The plating time used by Linford and Feder[3] was about one three-hundredth the time used in this study. It is possible for oxide reduction to continue for some, if not all, of the plating cycle or until all the oxide has been reduced. The physical condition of the boundary layer between the basis metal and the electroplate would, under these conditions, be one of solid copper and copper oxide. The copper would be non-adherent and non-coherent, but physically trapped under the electroplate. Beyond this 1000 Å (before immersion in the plating bath) limit, the adhesion decreased steadily as the amount of oxide increased. Thus, progressive decreases in adhesion were expected as the thickness of the original oxide film increased. A fairly regular relationship was found between adhesion and thickness of original oxide from an upper limit where the bond is stronger than the basis metal to the point of no adhesion. Films about 2200 Å thick required less than nine pounds force to detach. Beyond about 3600 Å, the nickel plate peeled spontaneously during the period of vacuum drying and a grey alloy of nickel and copper and/or cuprous oxide was clearly visible on the basis metal. The internal stresses were themselves sufficient to rupture the bond.

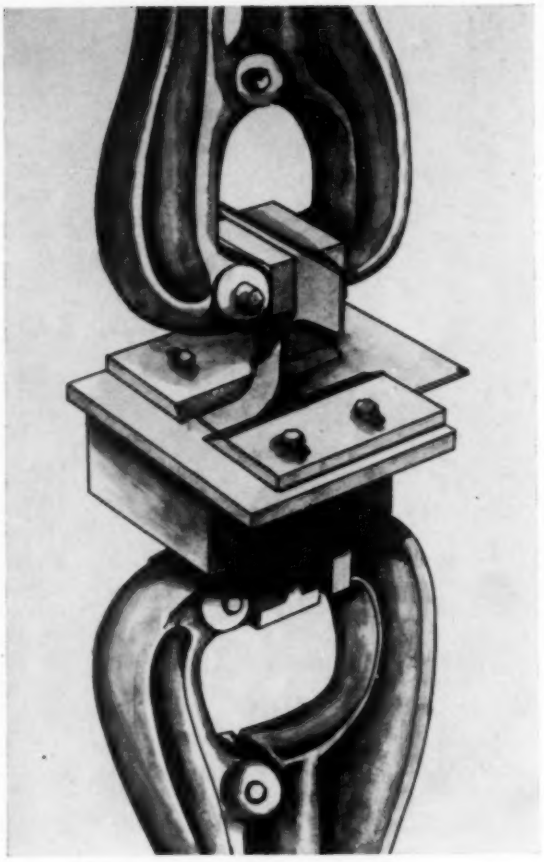

Fig. 2. Adhesion test equipment

Fig. 3 gives the above described relationship between oxide originally present and relative adhesion. Plotted on the same figure are the results of Linford and Feder[3] showing the weight of oxide remaining after plating as a function of the amount of oxide originally present. It should be remembered that the amount of oxide remaining after plating is that obtained by Linford and Feder using a maximum time of 12 seconds. The one hour plating time used in this investigation could result in much, if not most, of the oxide originally present being reduced. The copper produced by this continued reduction is then the cause of the weak bond.

SUMMARY

1. The adhesion of nickel plate on copper was not affected by oxide films up to a thickness of 650 Å, before the start of plating (1000 Å before immersion in the plating bath).*

2. Between 1000 Å to 2500 Å of copper oxide (before immersion in the plating bath),* the force to detach falls from the tearing strength of the copper to less than 9 lb in a fairly regular fashion.

3. When oxide thicknesses exceed 4000 Å, the nickel plate peels spontaneously during drying.

*See footnote (*) pg. 728.

*See footnote (*) pg. 728.

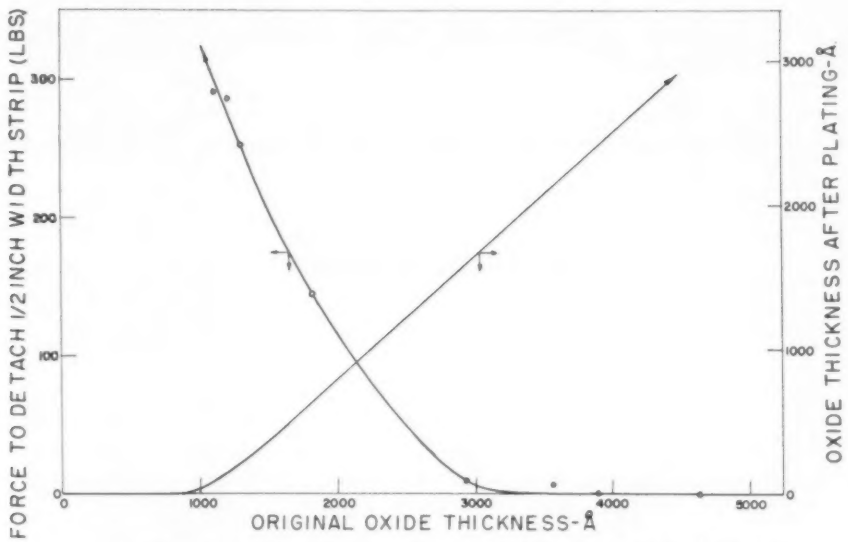

Fig. 3. Adhesion of nickel plate on copper as related to oxide thickness after plating

4. These results corroborated the findings of Linford and Feder, since their results would indicate adhesion problems if more than 650 Å of Cu_2O are present at the start of plating.

5. These results indicate that the plater should not experience poor adhesion due to a cuprous oxide film, since an oxide film thickness of the order of 200 Å is readily detected by eye.

BIBLIOGRAPHY

[1]Linford, H. B. and D. O. Feder, Plating **41,** 279–286 (1954).

[2]Linford, H. B. and D. O. Feder, Plating **41,** 1183–1187 (1954).

[3]Linford, H. B. and D. O. Feder, Plating **45,** 349–359 (1958).

[4]Jacquet, P. A., Trans. Electrochem. Soc. **66,** 393 (1934).

[5]Linford, H. B. and E. B. Saubestre, Plating **38,** 713–717, 847–855 (1951).

[6]Linford, H. B. and E. B. Saubestre, Plating **38,** 367 (1951).

[7]Wood, Donald, Metal Industry **36,** 330 (1938).

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Dr. Linford has been secretary of the Electrochemical Society, Inc. since 1949 and became vice president in May of this year. He is Director of AES Research Project No. 12 and a Fellow in New York Academy of Sciences.

Dr. Ambati Venkateswarlu was born in Guntur District, Andhra State, India. He received his BS degree in chemical technology at Andhra University, Waltair, India in 1939. He served as an assistant lecturer in chemistry at the Andhra Christian College, Guntur, Andhra State from 1940 to 1944. When Andhra University inaugurated the Master of Science degree in chemical engineering in 1944, he returned for graduate study and obtained his MS in 1945. He was awarded a DSc degree in chemical engineering in 1954. Andhra University added a course in electrochemical technology in 1953 and Dr. Venkateswarlu became an instructor in electrochemistry. The Government of India selected him under the Modified Overseas Scholarship Plan 1955–56 for advanced training in electrochemistry at Columbia University. During his stay at Columbia, the work presented in this report was accomplished under the direction of Professor H. B. Linford.

SALT SPRAY TESTING OF TINPLATED COPPER

2. Comparison of Corrosion Rates in Different Test Locations

by MARTIN S. FRANT*

The extent to which the standard salt spray test may be considered reproducible was studied by sending identical tinplated copper specimens to 15 different test locations. The results were evaluated by a chemical porosity test. Significant differences in corrosion results were found between different cabinets, and within individual cabinets, thus indicating the need for additional work on test variability.

I. INTRODUCTION

One of the most important aspects of salt spray testing, and perhaps the most difficult to measure, is the question of reproducibility.[1] Ideally, all salt spray cabinets operating under the same specifications should give an identical result if the identical sample could be submitted for test. The purpose of this paper is to report how far present practice for tinplated copper (the most common combination in the electrical industry) deviates from this ideal.

To accomplish this, samples were sent to over one dozen laboratories in the United States, with instructions to run a salt spray test on the samples according to ASTM Method B117-54T.[2] The laboratories included private companies operating their own salt spray equipment, commercial testing laboratories, and military installations. Because of its use in many government specifications, 20 per cent sodium chloride solution was specified. The samples were pre-strung, and detailed instructions were given for sample removal, drying, and return shipment.

There have been two major problems for those who have attempted to determine the reproducibility of the salt spray test. Since the test is destructive, the first problem is that of attaining a reproducible sample.[3] By its very nature any plating process is variable, and the experimental pitfalls in attempting to produce large numbers of identical samples are well known. Not only is it extremely difficult to reproduce an exact thickness of plating, but further difficulties are encountered one considers the other qualities such as porosity, grain structure, presence of impurities, and cleanliness of basis metal, which go into determining the exact composition of an electroplated sample and which may affect its resistance to salt spray.

The best way to get around this problem is to plate a large number of samples at one time and under one set of conditions, and the most practical way to do this is to barrel-plate the specimens. In barrel-plating, the thickness of the individual pieces will vary, but in an entirely random manner. Since all the samples are plated at one time, it is hoped that the other parameters will be either constant or normally distributed.

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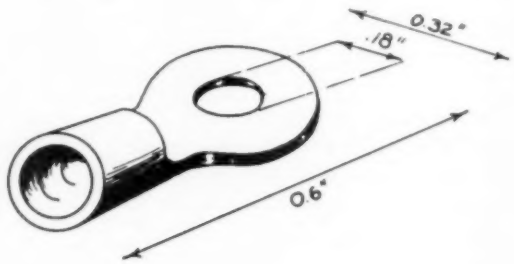
The specimens used in this work are from the same batch as those used in the previous report,[3] and were all barrel-plated at one time in an alkaline stannate bath. Fig. 1 shows the specimens, and Fig. 2 shows the distribution of tinplate thickness on these specimens. The measurements were made by irradiating the samples with X-rays and measuring the copper K_α fluorescence.[4]

As can be seen, the thickness varies from about 135 to about 240 micro-inches. The graph is on arithmetic probability paper, which has the characteristic that the usual bell-shaped curve for a normal random distribution comes out as a straight line. The results indicate that, as far as plating thickness is concerned, the samples are normally distributed about a mean. It is expected that as the number of samples increases, the points would cluster more closely along the "most probable" line. In this work, each point on the following graphs consisted of 8 strings of 10 specimens each. From the thickness distribution, for 34 samples, it is believed that 80 specimens would generally give a good random sample; the area for each point was about 3? sq in. of surface, and was considered adequate.

The second serious problem is determining the amount of



TEST SPECIMEN

Fig. 1. Tinplated copper specimens used in this test. Total surface area: 0.39 sq inches.

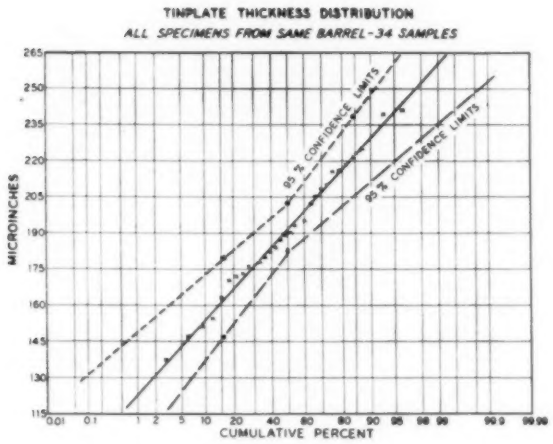


Fig. 2. Probability plot for thickness distribution. The central line shows the actual values obtained, the outer lines enclose the 95 per cent confidence envelope.

corrosion that has occurred. The most common technique used with the salt spray test is visual evaluation. However, it is extremely difficult to translate results from one worker to another, and there is relatively little information in the literature on this subject. In the previous paper,[2] a method was described which is believed to be more objective than the commonly used techniques. It is based on the rapid attack of copper by a solution consisting of equal parts of concentrated ammonium hydroxide and one molar ammonium persulfate. It has been found by other workers[5] that this solution is practically inert as far as tin is concerned, and is essentially linear in its attack on copper. This means that the amount of copper dissolved in a given period of time is directly proportional to the exposed area. This concept can be used to determine the amount of corrosion by measuring the exposed copper area before and after salt spray testing. Details of the method are given in the reference.[3] In that work it was found that after an initial induction period, all of the salt spray corrosion data, when plotted on log-log paper, appeared to give straight lines with a slope of approximately 2. Thus, the rate of corrosion could be expressed by an equation of the form $C = Kt^2$. It appeared that variations in the test procedure, including variations in the *p*H of the solution, affected the initial rate, but did not significantly change the slope for the final rate.

With this background and with these techniques, it was felt that it would be possible to make some measure of the reproducibility of the salt spray test as run in different localities throughout the country. The results reported herein have been considered as indicative of the variation to be expected in current practice, rather than as a measurement of the absolute reproducibility of the test.

II. TEST RESULTS AND DISCUSSION

Fig. 3 shows the results of three tests in Harrisburg, Pennsylvania. Curves A and B were run during August of 1956 in a small locally-constructed box having a 3.5 cu ft capacity. Curve C was run during June of 1957 in a large box (30 cu ft) built by manufacturer "P". In this report, for the purpose of comparing curves, two values are used. These are the slope, and the intercept at 150 hours. In the Harrisburg test, it can be seen that the slopes vary somewhat, but that the intercepts at 150 hours are almost identical and give porosity indices varying from 13 to 16.

Fig. 4 shows the results of a test in Pittsburgh during June of 1957. The cabinet was of identical construction to that of Curve C in the previous figure. A very definite induction period can be seen and a somewhat more severe final slope and pososity index at 150 hours were noted.

The next figure shows the result of a test in a consulting laboratory in Detroit, Michigan. A larger cabinet (48 cu ft, manufacturer "P") was used for this test, but the results are regarded as comparable to those observed in Harrisburg.

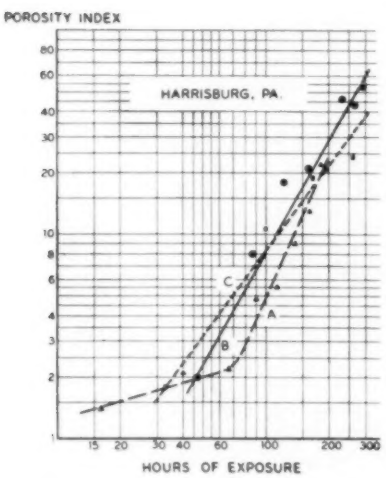


Fig. 3. Results of Salt Spray Tests in Harrisburg, Pa., August 1956 and June 1957. Porosity index vs. hours of exposure. Cabinets: A, B, of local construction, 3.5 cf.; C, manufacturer "P," 30 cf. Slopes: A—2.3, B—1.8, C—1.4. Porosity Indices at 150 hours: A—13, B—16, C—15.

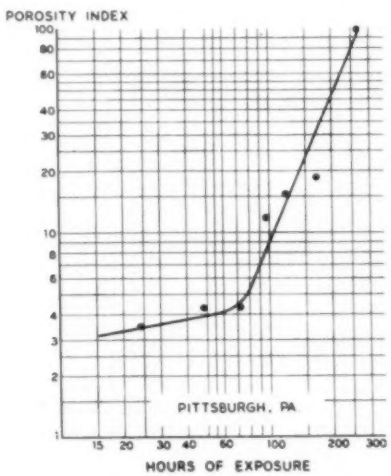


Fig. 4. Salt Spray Test in Pittsburgh, Pa., July 1957. Cabinet: manufacturer "P," 30 cf. Slope: 2.4; P.I. 150: 25.

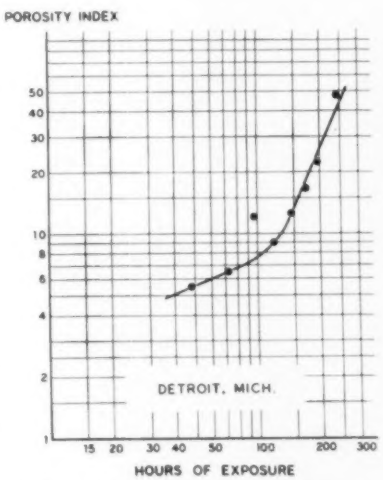


Fig. 5. Salt Spray Test in Detroit, Michigan, July 1957. Cabinet: manufacturer "P," 48 cf. Slope: 2.3; P.I. 150: 13.5.

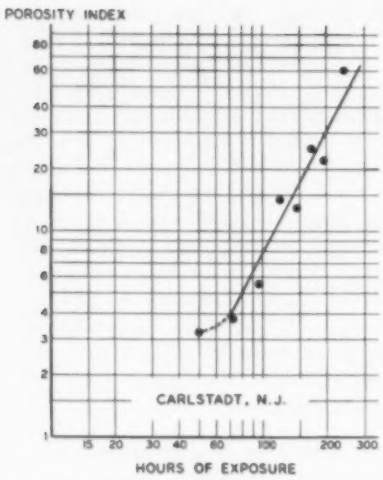


Fig. 6. Salt Spray Test in Carlstadt, N. J. (N. Y. Metropolitan Area); August 1957. Cabinet: manufacturer "P," 9 cf. Slope: 2.0; P.I. 150: 18.

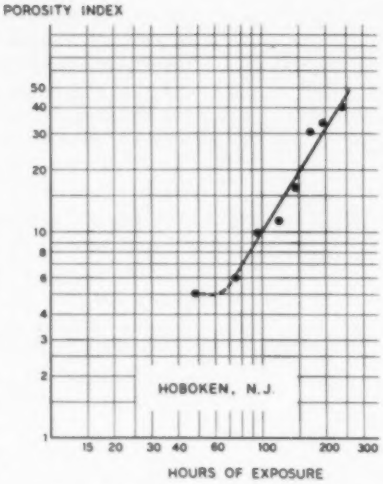


Fig. 7. Salt Spray Test in Hoboken, N. J. (N. Y. Metropolitan Area); August 1957. Cabinet: manufacturer "P," 30 cf. Slope: 1.6; P.I. 150: 20.

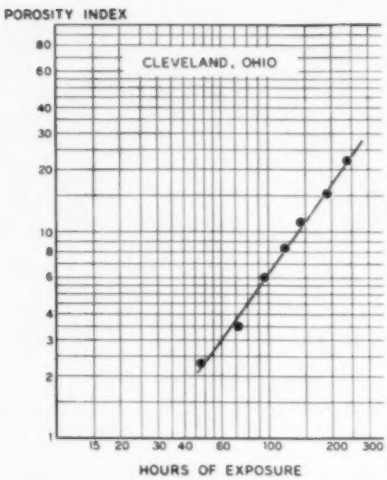


Fig. 8. Salt Spray Test in Cleveland, Ohio; August 1957. Cabinet: manufacturer "P," 11 cf. Slope: 1.5; P.I. 150: 11.

Figs. 6 and 7 show the results of tests at two laboratories in the same vicinity of the New York metropolitan area. Although the cabinet sizes were different, the results, particularly the 150-hour intercepts, are virtually identical. The Hoboken test was run in a cabinet identical to that of test "C" at Harrisburg and to the one used at Pittsburgh.

Fig. 8 shows the results obtained at a consulting laboratory in the Cleveland, Ohio area during the summer of 1957. The results were somewhat milder than in the previous tests, but had excellent internal agreement.

Fig. 9 gives the results of two tests run in El Segundo (Los Angeles), Calif. Curve A is the result of a test at an aircraft company, and both the slope (2.7) and the 150-hour intercept (45) were more severe than any of the results obtained up to that time. The cabinet was identical to that used in Fig. 1 (Curve C), Fig. 4 and Fig. 7. The data for Curve A appeared to have good internal agreement, and a great deal of specific information was supplied about the operating conditions during the test, all of which failed to disclose any reason for discrepancy. It was suggested[6] that perhaps smog conditions might be a factor in the severity of this test, and so a second test was run in the same vicinity. The results are shown as Curve B. This test, at a consulting laboratory which has a box of its own construction, gave one of the least steep slopes in this survey and an intercept of approximately the same magnitude as Harrisburg, Cleveland and Detroit.

Data obtained from the Los Angeles Air Pollution Control District for the El Segundo area[7] are shown in Table I. Because there is a positive correlation between smog conditions and the results in Fig. 9, this table has been included in this report. The operators of both cabinets did not believe that outside air pollutants could affect the results because the incoming air was both filtered and washed. As will be seen, there was no clear-cut correlation between industrial and non-industrial locations and test severity.

Fig. 10 shows the results of two tests in the same salt spray cabinet in Chicago, Ill., during July and August 1957. Because Curve A had such a high intercept, but a slope similar to those observed in the past, it was decided to repeat the test. Curve B shows the results of the second test. According to the laboratory which ran both these tests, samples from Curve A were stored (during humid weather) after removal from the box without having been washed and dried until completion of the test. When the results shown in Curve B were obtained, the purpose of the test was known and great care was taken to assure that the samples were cleaned and dried immediately. It is not clear whether this explanation for the difference between the two tests is adequate. Since different samples would have been out for different lengths of time, the slope should have changed if immediate washing were a factor.

Fig. 11 shows the results of two tests run in the same cabinet in Dayton, Ohio, in August and October 1957. The slope and PI_{150} for Curve A have been estimated at 1.2 and 35 respectively, but these values are only gross estimates. Curve B has a slope of approximately 1.5 and a PI_{150} of approximately 25. The lines plotted are least squares lines.

The large amount of scatter is difficult to explain. After

TABLE I

MAXIMUM CONCENTRATION OF AIR POLLUTANTS IN EL SEGUNDO AREA DURING SALT SPRAY TEST PERIODS

Pollutant	Maximum Concentration in pphm	
	March 1957	July-August 1957
"Oxidant"	22	13
Carbon Monoxide	3200	2400
Nitric Oxide	61	17
Nitrogen Dioxide	22	16
Sulfur Dioxide	55	*

*Data not available. Highest concentration reported in preceding 2-week period: 15, highest in following 2 weeks: 8.

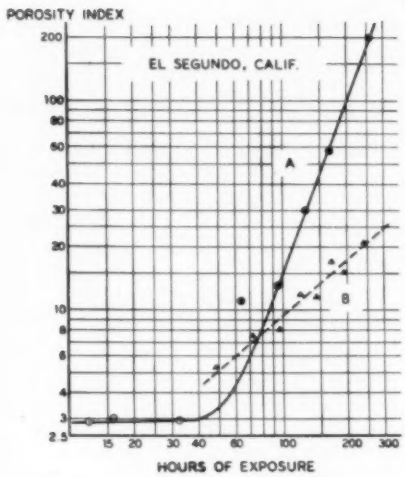


Fig. 9. Salt Spray Tests in the Los Angeles, California area; March 1957–August 1957. Cabinets: A, manufacturer "P," 30 cf.; B, local manufacture, estimated 20 cf. Slopes: A—2.7, B—0.9; P.I. 150: A—45, B—13.

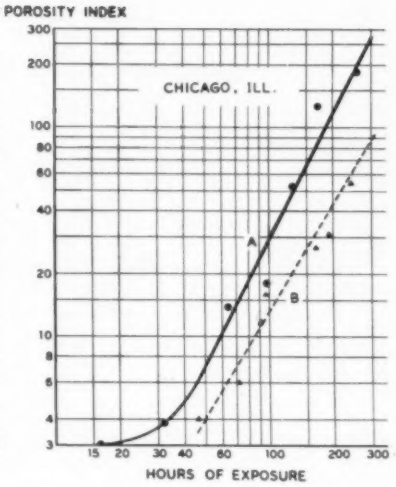


Fig. 10. Salt Spray Tests in Chicago, Ill.; July and October 1957. Cabinet: manufacturer "P," 48 cf. Slopes: A—2.1, B—1.8; P.I. 150: A—70, B—25.

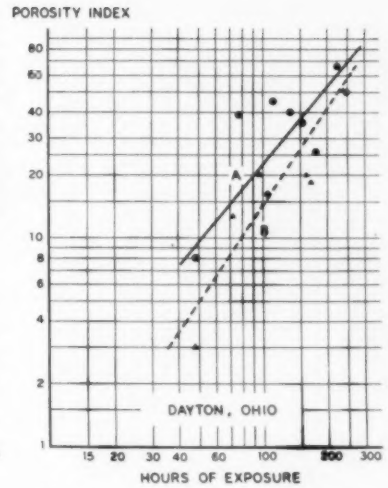


Fig. 11. Salt Spray Tests in Dayton, Ohio; August and October 1957. Cabinet: manufacturer "P," 11 cf. Slopes: A—1.2 (?), B—1.5; P.I. 150: A—35 (?), B—25.

the first test, it was found that the test instructions had been misunderstood, and that the samples were hung and removed in bundles of 80 each, instead of being randomly distributed. In the second test, the samples were carefully distributed through the box in a predetermined pattern. Although the scatter was reduced considerably, it is still present. An examination of the individual porosity readings failed to show any significant effect of position within the box on the amount of corrosion.

Fig. 12 shows the results of a test in the Philadelphia area which also had a somewhat higher scatter than usual, but the results are in general agreement with the other tests.

Fig. 13 describes the results obtained in a small box in Hanover, Pa. Here, as in Dayton, a misunderstanding of the test instructions resulted in the samples being hung together in bundles of eighty. Until the Poughkeepsie results (below) were obtained, the unusually low corrosion was attributed to the hanging technique.

Fig. 14 is the result of a test at an industrial laboratory in Poughkeepsie, New York. The results of this test showed this cabinet to be one of the least corrosive in this survey. Because the location of the individual specimens in the box was known, an attempt was made to correlate box position with the amount of corrosion. The strings had been hung in a square $1\frac{1}{2}$ x $1\frac{1}{2}$ ft, with the nearest edge of the square 1 ft from the nozzle. From Fig. 15, it can be seen that the spray is apparently directed toward one side of the box, and that the corrosion falls off from one side to the other. Secondly, although the sample rows were approximately 3 in. apart, there is a very definite shielding effect by the outside rows.

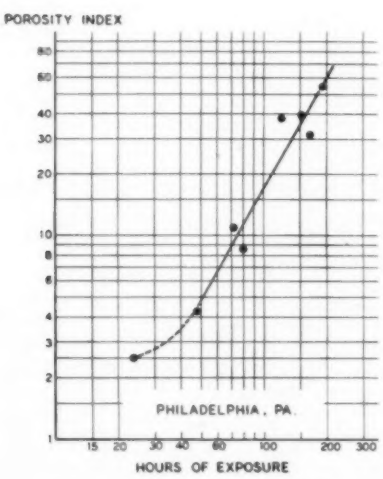


Fig. 12. Salt Spray Test in Philadelphia, Pa.; August 1957. Cabinet: manufacturer "P," 60 cf. Slope: 1.9; P.I. 150: 35.

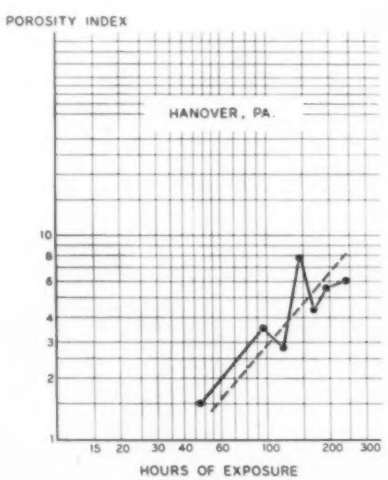


Fig. 13. Salt Spray Test in Hanover, Pa.; June 1957. Cabinet: manufacturer "P," 1.5 cf. Slope: 1.2; P.I. 150: 5.

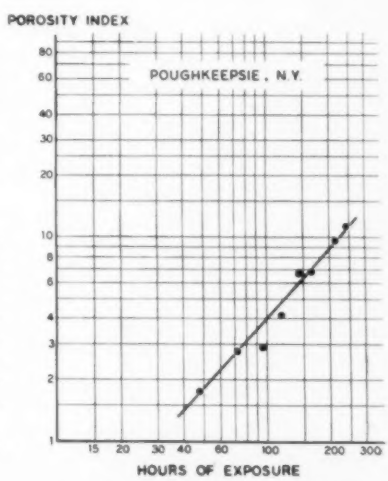


Fig. 14. Salt Spray Test in Poughkeepsie, New York; October 1957. Cabinet: manufacturer "P," 11 cf. Slope: 1.2; P.I. 150: 6.

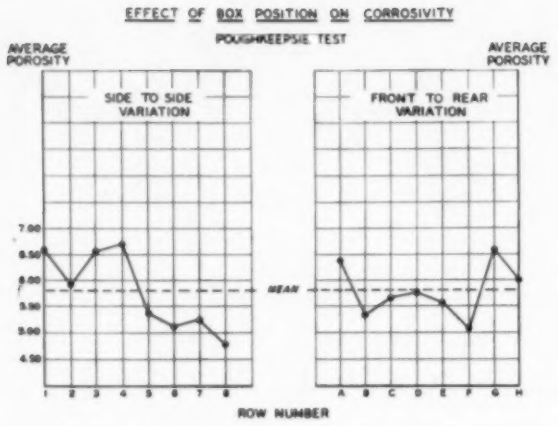


Fig. 15. Variation of corrosivity within Poughkeepsie test cabinet. Porosity index vs. position within cabinet. Row A is closest to the nozzle.

Thus the samples in the front and rear ends show significantly more corrosion than the samples in the middle.

Table II was prepared to correlate the data shown on the preceding graphs. In addition to the slope and porosity indices, an additional value is listed. In earlier experience it was found that a porosity index of about 10 approximately coincided with the amount of corrosion an experienced observer would report as failure. The time of exposure until a porosity index of 10 was reached is listed in the table as "Hours to 'Failure'".

III. CONCLUSIONS

On the basis of the data presented in this work, the following conclusions may be drawn:

1. Without the factors of sample reproducibility and variance in visual interpretation of the results, large differences in results are possible under present specifications for the salt spray test.

TABLE II

SUMMARY OF SALT SPRAY TESTS

Location	Slope	P. I. -150 Hours	Hours to "Failure"*
Hanover**	1.2	5	290 (approx.)
Poughkeepsie	1.2	6	220
Cleveland	1.5	11	140
Harrisburg	2.3	13	135
Detroit	2.3	14	130
Harrisburg	1.4	15	115
Harrisburg	1.8	16	110
El Segundo	0.9	13	110
Carlstadt	2.0	18	110
Pittsburgh	2.4	25	105
Hoboken	1.6	20	100
Chicago	1.8	25	90
El Segundo	2.7	45	85
Dayton**	1.5	25	80
Philadelphia	1.9	35	75
Chicago	2.1	70	60
Dayton**	1.2	35	55

*Arbitrarily set at a porosity index of 10.
**Data considered unreliable because of unusually great "scatter".

2. While geographic or local conditions may be a factor in these differences, variations in the operation of the test cabinets, and variations in corrosivity within the individual cabinets are believed responsible for most of the observed differences.

IV. SUGGESTIONS FOR FURTHER WORK

1. One of the basic objections to the salt spray test has always been the fact that correlation with actual exposure conditions was very uncertain. Using the above techniques and data it should be possible to compare typical salt spray cabinet results with outdoor exposure, or exposure in any other environment. The slope of the *corrosion vs. time* curve gives an indication as to whether the corrosion is proceeding by the same mechanism, and the value of the intercept would indicate the relative severity for test cabinet and outdoor tests (within the limits imposed by the reproducibility of the respective tests).
2. The possible role of local atmospheric conditions on test severity needs further investigation.*

ACKNOWLEDGMENT

This paper would not have been possible without the gracious cooperation of the technicians and operators of the cabinets in the various locations. The encouragement and help received from F. H. Wells, and the discussions with Galen Eley and Herbert Smalls of the Electronic Components Laboratory at Wright Air Development Center and E. K. Camp of the Corrosion and Finishes Laboratory of IBM, are gratefully acknowledged. Anna Inswiler performed all of the chemical analyses.

REFERENCES

[1]Committee Reports, ASTM. Proc. **33,** Part I, 178–208 (1933); J. Pomey, Metaux et Corrosion, **12,** 47–51 (1937); P. Brenner, Chem. Fabr., **10,** 486–91 (1937); O. Bauer, Zeitschrift fur Metallkunde, **28,** 25–9 (1938); A. Portevin, Metaux of Corrosion, **15,** 17–29 (1939); L. J. Waldron, ASTM. Proc. **44,** 654–62 (1944); V. M. Darsey and W. R. Cavanagh, ibid., **48,** 153–66 (1948); A. Mendizza, Plating, **44,** 166–75 (1957), and ref. 2–4 therein.

[2]Specifications and Tests for Electrodeposited Metallic Coatings, ASTM., Phila. (1955), pp. 33–40.

[3]Frant, M. S., Plating, **45,** 157–60 (1958).

[4]Zemany, P. D. and H. A. Liebhafsky, J. Electrochem. Soc., **103,** 157–60 (1956).

[5]Schuermann, E. and H. Blumenthal, Elektrotech. Zeit., **36,** 1295–7 (1927); M. Zuerchner and J. Lueder, Bull. Schweiz. Elektrotech. **42,** 271–5 (1951).

[6]Wells, F. H., private communication.

[7]Griswold, S. and J. R. Taylor, Los Angeles Air Pollution Control District, private communication.

[8]Cf. Project 15 Report, Plating, **45,** No. 5, 514 (1958).

*The use of high-pressure (bottled) air from one source transported to several locations as a possible investigating technique has been suggested by one of the reviewers.

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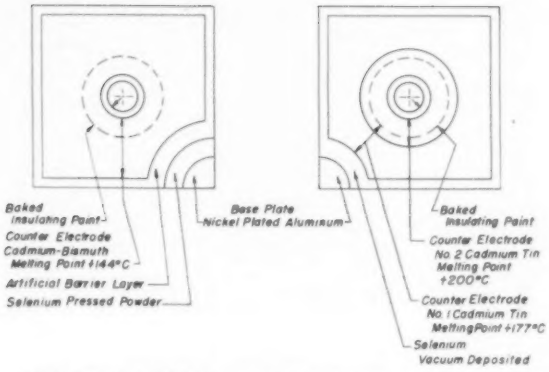
Baked Insulating Paint
Counter Electrode Cadmium-Bismuth Melting Point +144°C
Artificial Barrier Layer
Selenium Pressed Powder
Base Plate Nickel Plated Aluminum
Baked Insulating Paint
Counter Electrode No. 2 Cadmium Tin Melting Point +200°C
Counter Electrode No. 1 Cadmium Tin Melting Point +177°C
Selenium Vacuum Deposited

CELL COMPARISON. Left, Cell made by the pressed powder method. At the right, HCD Petti-Sel vacuum process cell.

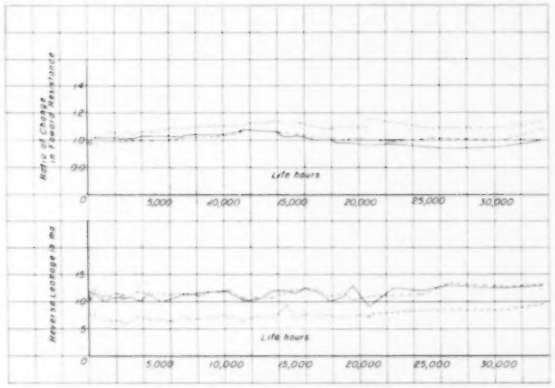

Fig. 1. Curves of three typical rectifiers of the type described showing ratio of change in forward voltage drop as related to initial voltage drop, and change in reverse leakage.

MANUFACTURING A NEW HIGH CURRENT DENSITY SELENIUM RECTIFIER

by JULIAN LOEBENSTEIN*

As a result of five years of intensive research developments by a prominent manufacturer** of West Germany into the art of selenium rectifier manufacture, a new and in many respects unique selenium cell is now being produced in the United States. It operates at much higher current density than heretofore considered standard and offers at the same time improved electrical properties and stable characteristics indicating a 100,000-hour life.

Selenium rectifiers, first made on a commercial scale in Germany, were brought to the United States a quarter of a century ago. In those days each cell—first known as a disc and later, when rectangular forms appeared, a plate—was rated as being able to operate at an alternating potential of eighteen volts. The product varied in quality and also in aging characteristics.

Originally the rectifier cell was made on an iron base plate. Although the iron base plate is still in use, the American market has in the main swung to the use of aluminum. At that time selenium was applied to the base plate by melting it and spreading it on the base plate. Then on top of the selenium there was placed a layer of cadmium bismuth alloy known as the counter electrode. Later the selenium was applied in the form of powder which was made to coalesce and adhere to the base by being placed in a press with heated platens. Still later the selenium was applied by vacuum methods.

Rectification takes place between the selenium and the counter electrode and the voltage which can be supplied is determined by the nature of the barrier formed at the junction of the selenium and the counter electrode. Much research and experiment was devoted to the problems of procuring greater uniformity, longer life and higher voltage.

INTRODUCTION OF LACQUER FILM

As experimentation proceeded it was found that by introducing a thin film of lacquer between the selenium and the counter electrode, the cells could be made to withstand higher voltages and before long standards were raised to 26 volts. Many stacks using cells at this rating have been in service for periods ranging to eight years and possibly longer. Cells rated at 33, 36 and some at 45 volts have also been developed.

In both the United States and in Europe, research was devoted to improving the methods of applying the selenium. In the United States effort was expended in the field of barrier layers with the goal of higher cell voltages. In Germany, on the other hand, the manufacturer's scientists believed that the barrier layer had certain inherent characteristics which had a tendency to cause a reduction in output voltage, or "aging," as the rectifier continued in use. As a result, their effort was channelled into improving the method of manufacture. The aim was a smaller cell for a given current rating without, at the same time, sacrificing efficiency, stability of output voltage or the long life of the rectifier.

In the process described, a metal base plate is used at the start, much as is the case with many other methods of manufacture. These base plates are put through a series of chemical and thermal treatments and then they are placed in a vacuum chamber. Here the selenium is carefully applied under automatically controlled conditions to insure a semiconducting layer of continual good quality. After being removed from the vacuum chamber, cells are placed on a conveyor line. They pass through a series of ovens and under an automatic spray gun which applies the counter electrode.

PROCESS ADVANTAGE

During the first stage of the processing, internal conversion takes place. This effects a crystalline modification of the selenium, thus yielding the best conducting properties. In the second stage, the internal structure of the counter electrode is improved as is its bond to the selenium. These changes constitute the advantage of the Siemens process.

*Semiconductor Sales Manager, Radio Receptor Co., Inc., Brooklyn 11, N. Y.
**The Siemens Companies

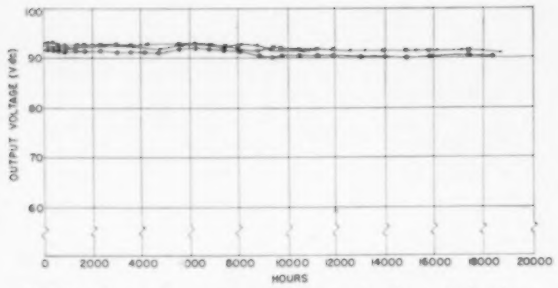

Fig. 2. Curves showing output voltages for three single-phase bridge rectifiers, input voltage 108v.

The counter electrode does not cover the area at the center of the cell where current is collected. In this area a different alloy at higher melting point is applied because greater resistance to heat is required.

After these operations, the cells are electroformed in the same manner as are cells made by any other process.

The long, stable life of German-type cells is shown in Figs. 1 and 2, which are typical curves for this new type of cell. Fig. 1 indicates the negligible drop in output voltage over a period of nearly 20,000 hours, while Fig. 2 shows the per cent change in the forward voltage drop over a period of more than 30,000 hours. The change does not exceed 17 per cent, and this per cent change in forward voltage drop in turn represents a negligible drop in the output voltage.

The significance of this small (17 per cent) change in the forward voltage drop can better be appreciated if this change is compared with the 100 per cent change which is often

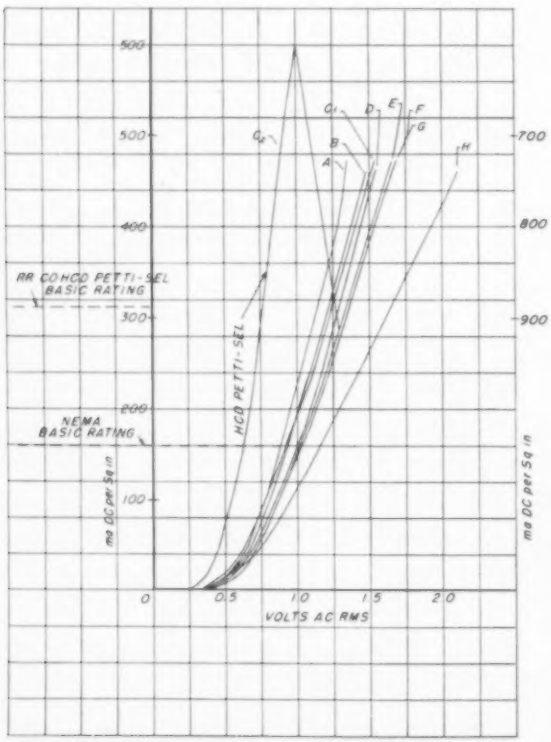

Fig. 3. Comparative voltage of HCD Petti-Sel (Curve C_2), as compared with other American cells made by the vacuum process.

Fig. 4. Eric Waldkoetter, left, who came over from West Germany to install equipment used in the new selenium rectifier manufacturing process, makes an adjustment while the author observes. The vacuum chamber behind Mr. Loebenstein is a key production unit.

considered reasonable. This 100 per cent change is considered an arbitrary definition of stack aging and does not necessarily coincide with the end of useful life of the rectifier stack.

With such stability of output voltage it may be concluded that the rectifier may well be rated at a probable life of 100,000 hours. But the remarkable achievement consists in the improvement of the electrical characteristics obtained simultaneously with the reduction in cell size for a given current rating. This improvement in electrical characteristics is shown in Fig. 3. From this it may be seen that operating at 320 ma/sq in. there is a forward drop in each cell of 0.75 volts, whereas the average American cell operating at half that current density; namely 160 ma/sq in., has a drop of almost one volt. It is expected that over a period of 100,000 hours this forward drop of 0.75 volts will not increase by more than 100 per cent. Conversely, this means that there is a smaller voltage drop in the cell for a given current, resulting in a lower energy loss and a correspondingly higher efficiency. Since the total rectifier area is smaller for the same current rating the rectifier reverse current will also be correspondingly reduced as will the energy losses resulting therefrom.

CELL SIZES

These new cells are available for electroplating and similar applications in sizes ranging from 4 x 4 in. to 8 x 16 in. Each of these are at present rated at approximately twice the current density of those made by other methods. For instance, a cell 4 x 4 in. can be used in place of a cell 5 x 6 in., and new developments may before long permit a still further reduction in cell size.

Rectifier stacks using cells in sizes 4 x 8 in. and up to 8 x 16 in. are assembled with a multiplicity of studs, one stud being supplied for each 4 x 4 in. area. Single powdered metal washers are used as cell separator or contact washers. These give higher conductivity than multiple washers; likewise, the powdered washers may be held to close tolerance so that surfaces are parallel and exactly the same distance apart in all washers of a given dimension. Thus, when a stack using a multiplicity of studs is assembled, it is certain that there will be no tilting or cocking of cells, because all distances will be equal and contact pressure will be the same. As a result, no hot spots will be developed.

The quality of the cells made by this process is the result

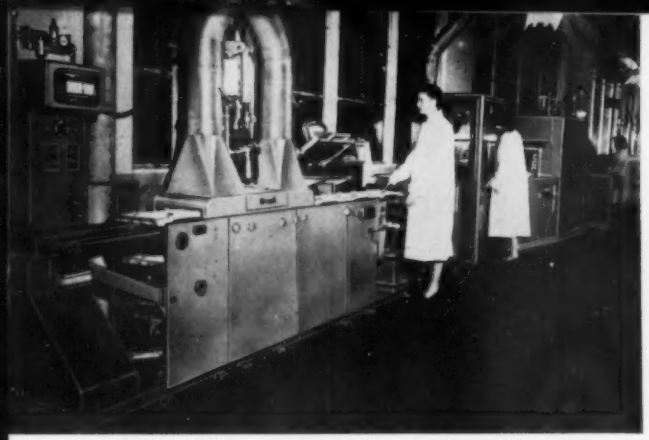

Fig. 5. White smocked, white gloved workers at stages of production line. The long machine at left is an automatic alloy applicator. The next step is spraying insulating paint for "dead centers" which keep rectifiers from shorting under the contact washer. The worker at far right is feeding cells into a thermal processing unit.

of almost completely automatic manufacture with time and temperature cycling mechanically and electronically controlled. Some of the units used in a 200-foot continuous production line are shown in Figs. 4 and 5. Even the counter electrode is applied with an automatic spray gun, shown in Fig. 5, assuring an even coating on the cells passing under the gun at a uniform speed on a conveyor belt. All the operations take place in an air conditioned room in which the temperature is closely controlled.

Fig. 6 shows the stacks, without the transformers and auxiliary equipment of a plating rectifier manufactured in Germany and installed in Hamilton, Ontario, Canada. It has a direct current rating of 9 volts and 10,000 amp. The stacks are fan cooled with air at a velocity, over the stacks, of 1100 lineal feet per minute. The use of air at this velocity permits the stacks to be used at current densities, in many cases, as high as three times their convention cooled rating. This is possible because of the inherent low losses in this new type of cell. It is thus possible to use the stacks to their highest potential, without sacrifice of enduring qualities.

In Europe these rectifiers have been applied to many diversified uses, some of which are shown in Figs. 7a and 7b.

*Radio Receptor Co., Inc., Brooklyn, N. Y., a subsidiary of General Instrument Corp., manufactures under brand name of HCD Petti-Sel.

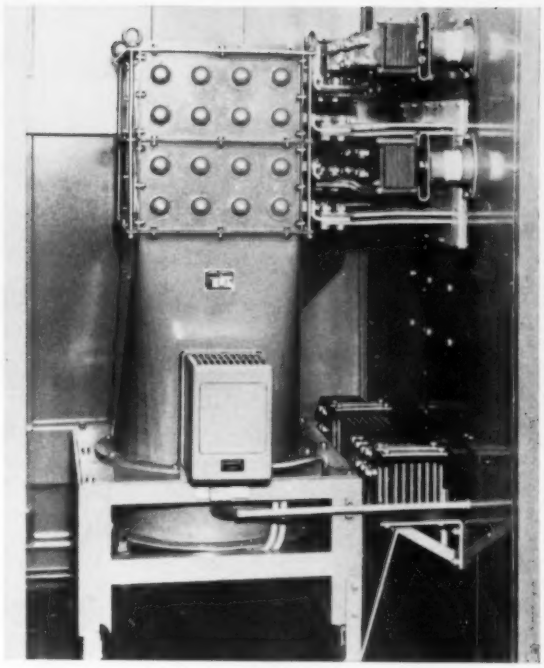

Fig 6

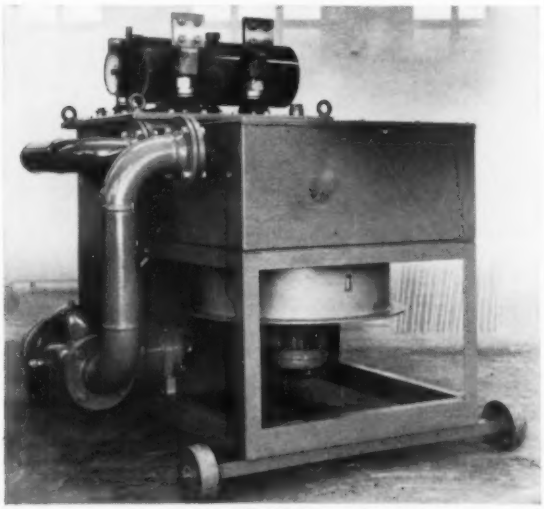

Fig. 7a

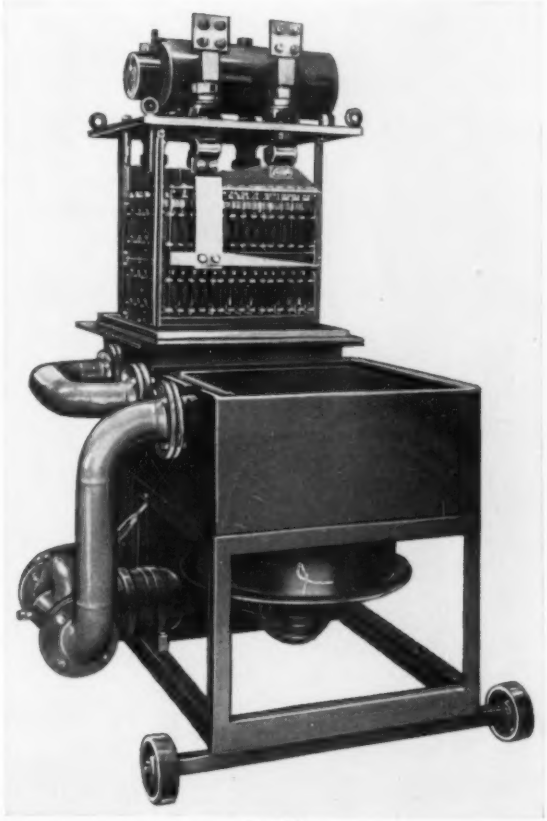

Fig. 7b

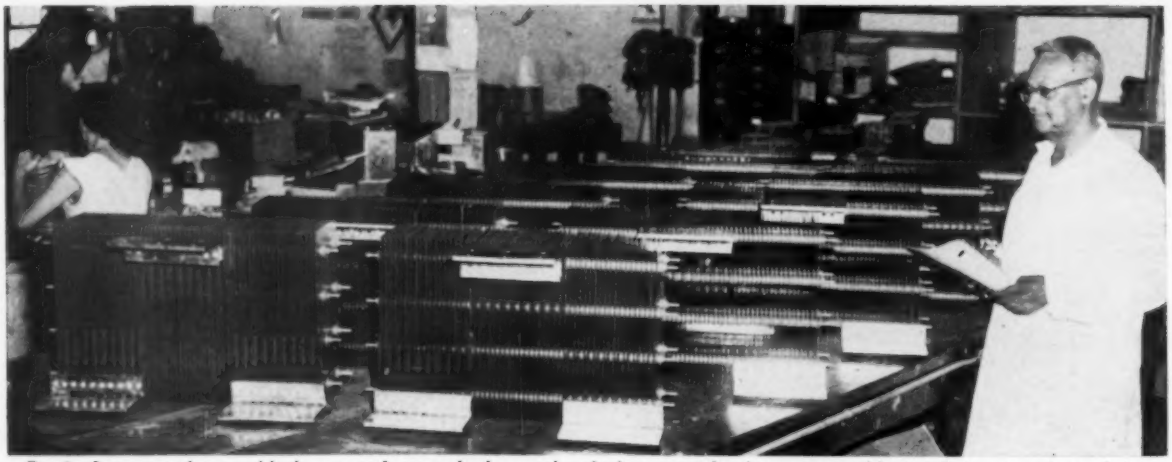

Fig. 8. Power rectifier assembly department foreman checks an order of selenium rectifiers being prepared for installation at an electroplating plant.

Fig. 8 shows a group of stacks now operating in equipment supplying a 50,000-amp, 9-v plating installation. Figs. 9 and 10 show other plating applications.

The equipment in Fig. 9, with 8-by-16-in. cells, will supply 1500 amp at 9 v.

Fig. 10 shows part of a unit to be used for electroplating in Formosa. The rectifiers will supply 500 amp at 12 v. Tests show a conversion efficiency of 77 per cent at full load with a temperature rise of 6C above ambient. It is operated with ac at 380 v input and uses a three-phase half-wave connection.

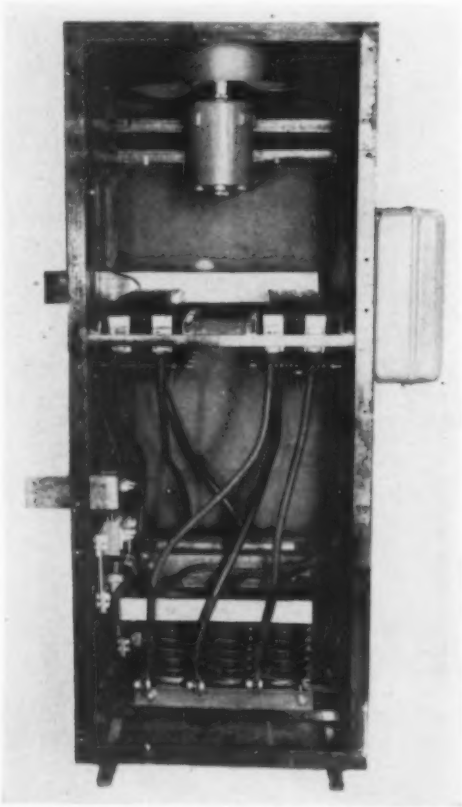

Fig. 9. Plating equipment whose 8 x 16-in. plates supply 1500 amp at 9 v.

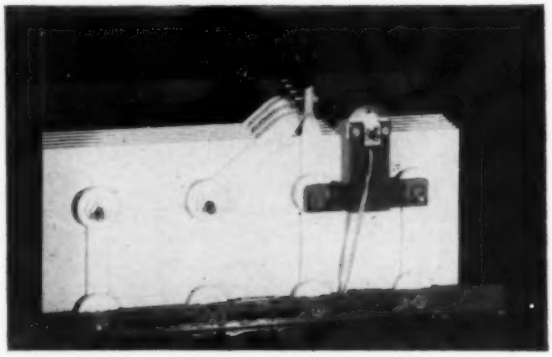

Fig. 10. Rectifier section of an electroplating unit to be used in Formosa. The plates, which can supply 500 amp at 12 v, are operated with ac at 380 v input and use a three-phase, half-wave connection.

Julian Loebenstein is sales manager of the Semiconductor Division of the Radio Receptor Co., Brooklyn, N. Y., a General Instrument Corp. subsidiary. He writes about selenium rectifiers on the basis of many years of experience in rectification for the plating industry.

Mr. Loebenstein was graduated from Columbia University as an electrical engineer in 1912. In the years that followed he held a number of administrative positions, including that of captain in the Corps of Engineers during World War I. He was with Consolidated Edison of New York for 15 years as sales manager for gas appliances before he joined Radio Receptor 15 years ago.

During World War II, Mr. Loebenstein was production manager for Radio Receptor, itself a pioneer firm in the field of communications equipment. He took over as semiconductor sales manager in 1946.

Mr. Loebenstein is a member of the American Institute of Electrical Engineers and of the National Association of Corrosion Engineers. He was formerly section chairman of the semiconductor division of the National Electrical Manufacturers Association.

INDICATE A 724. ➤

STUTZ—

PRESENTS

A NEW DESIGN

in PLATING BARRELS—

Featuring

Motor drive integrally mounted

Complete cycle

Continuous rotation from one operation to the next

Cog belt cylinder drive

Positive grip one piece outboard mounted cog pulleys

The Stutz Co. has advanced plating barrel design and construction so that today these units are highly productive and maintenance reduced to a minimum. Costly replacement parts such as cylinder gears and bearings are eliminated completely. The only expendable parts are the belts. To provide long belt service, a special non-stretch cog belt with internal steel reinforcement is used. Belts can be changed, if necessary, in seconds at the tank without tools. The Stutz hanger extends below the cylinder thereby adding protection to the cylinder and also permitting the assembly to be lowered to the floor. The Stutz assembly incorporates a lock-in design that permits removal of the cylinder instantly from the hangers without the use of tools. This means cylinders with special perforations or partitions can be installed or removed quickly.

The motor-combined unit shown affords special economy since drives on tanks are not required, and rotation of the cylinder can be continued from one operation to the next. Solution dragout is therefore reduced to a minimum. This design is ideal for application on the carriers of a full automatic conveyorized plating machine.

The motor drive to the countershaft is through bevel gears operating in a gear case and permanently lubricated. Standard R.P.M. of the cylinder is 5; however, other speeds are obtainable at no extra cost.

The initial cost of belt driven units is substantially lower than gear driven barrels, and maintenance virtually eliminated.

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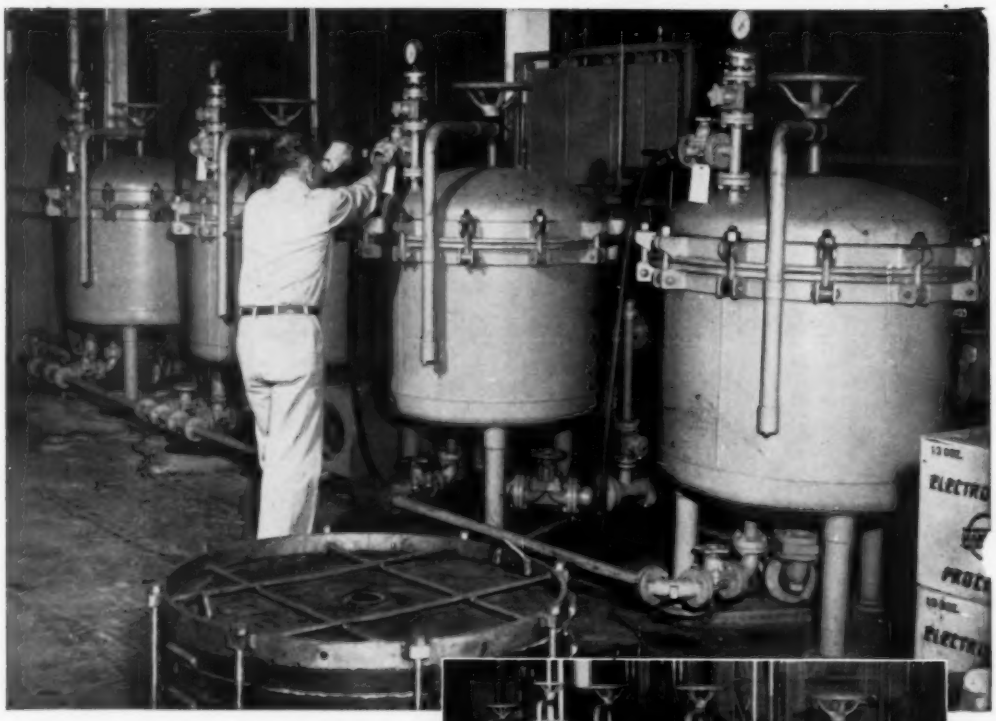
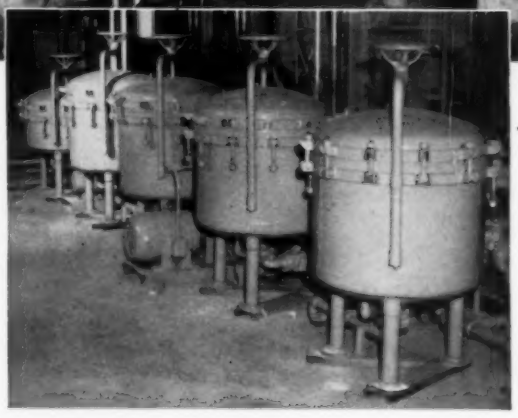
Complete Metal Finishing Equipment and Supplies





High Flow Rates Low Servicing Cost *give* Low Cost Filtering of Plating Solutions—

Plating Plant Engineers will find Sparkler filtration engineers most co-operative to work with on installations of any size.

SPARKLER *horizontal plate* **FILTERS**
(the original horizontal plate filter)

2,208,000 gals. of bright nickel solution are filtered in these four Sparkler Horizontal Plate filters (top illust.) through a continuous 5 day cycle with 24 hour operation. Filters are cleaned once a week by lifting out the plate cartridge and replacing it with a fresh dressed set of plates. Only a few minutes is required for this operation.

In the same plating plant, (lower illust.) the four large Sparkler filters are used to filter suspended matter from Ronal bright copper solution. These filters have a flow capacity of 4800 G.P.H. each. The small, far end unit filters suspended matter from a copper strike bath. Capacity 2,100 G.P.H.

On occasion these filters are employed for filtering out activated carbon and lime from copper solution and activated carbon and nickel carbonates from nickel solution.

SPARKLER MANUFACTURING CO. MUNDELEIN, ILL.
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Manufacturing plants in Canada, Holland, Italy, and Australia.

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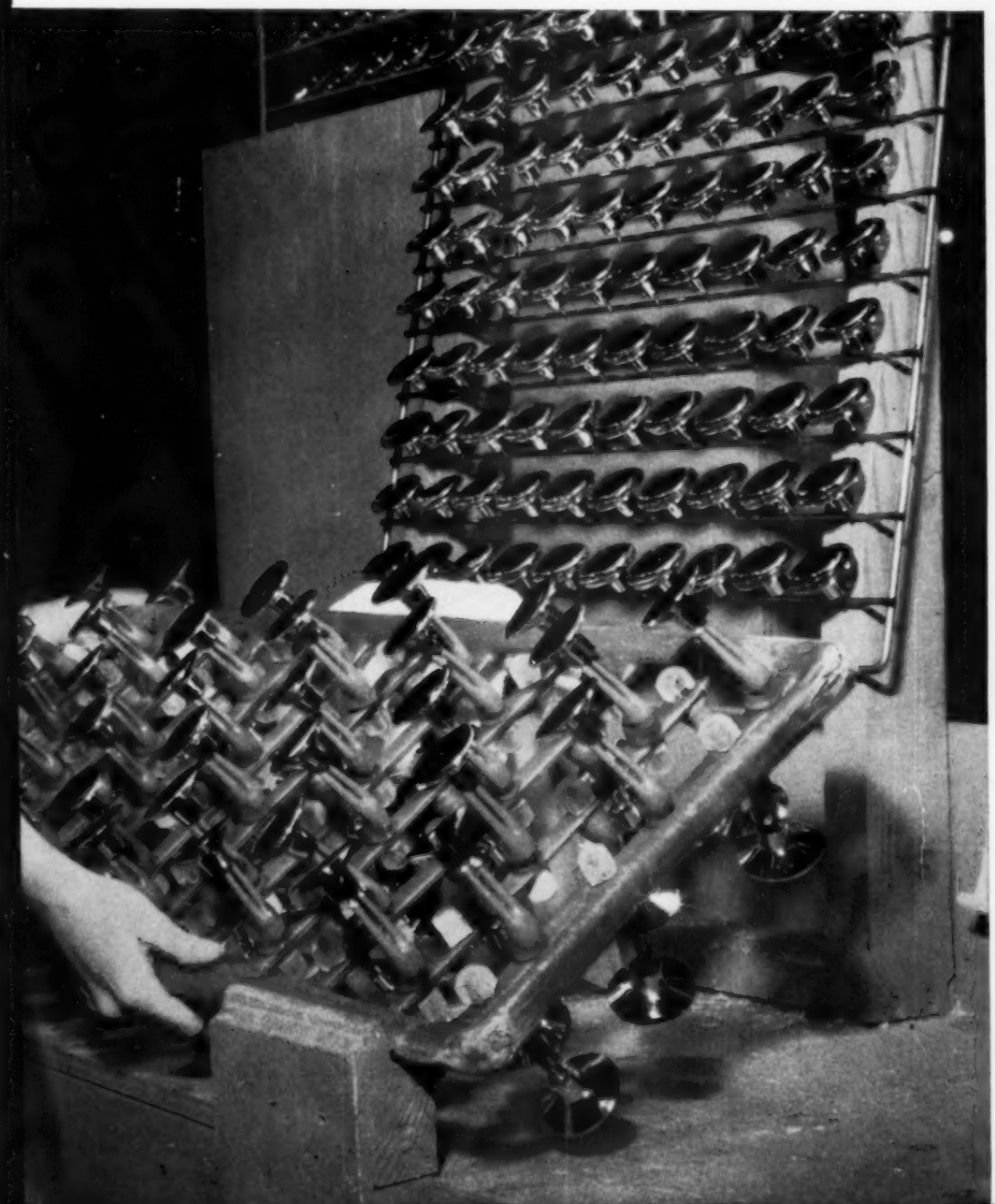
Unique new brightener for zinc and cadmium plated parts has been developed by Federated: CONMAX, a conversion coating for plated finishes from brilliant to iridescent, provides corrosion resistant film to zinc and cadmium plate. Other high quality, low-cost brighteners from Federated: ZIMAX for all types of zinc plating, still, automatic, and barrel; CADMAX for cadmium plating; NIMAX, highly concentrated brightener for nickel barrel plating. These brighteners undergo rigid competitive tests before approval for sale. This also applies to Federated's complete line of plating anodes and nickel salts. It's safest when you specify plating supplies from Federated Metals Division of American Smelting and Refining Company, 120 Broadway, New York 5, N. Y. In Canada, Federated Metals Canada, Ltd., Toronto and Montreal.

FEDERATED METALS DIVISION OF



ASARCO

AMERICAN SMELTING AND REFINING COMPANY

THE 45th ANNUAL CONVENTION PASSES IN REVIEW

MEETING THE HIGH CONVENTION STANDARDS of the American Electroplaters' Society (AES) in every way though it fell moderately short of its targeted attendance mark due mainly to the effects of the business recession currently prevalent generally, the 45th Annual Convention held at the Sheraton-Gibson Hotel in Cincinnati, May 19–22, 1958, passed into AES history with a creditable mark earned by performance and effectiveness.

Immediate forerunner of the Golden Jubilee Convention and Industrial Finishing Exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing, to be conducted by the AES in Detroit, June 15–19, 1959, as climax of its Fiftieth Anniversary observance, the 1958 Cincinnati Convention provided a well-balanced program of educational, business and relaxational fare against a backdrop of good site and convention accommodations and a well-coordinated and managed assembly of AES members and their families.

This 45th Annual Convention, occurring in the Society's 49th year, marked the AES's first return to Cincinnati for a national meeting since its successful 10th Annual Convention held here in 1922. It culminated four arduous years of planning and effort by the industrious Convention Committee of the AES's Cincinnati Branch whose escutcheon boasts some 45 years of devoted AES service.

Charles Wise headed that committee as General Convention Chairman aided by Ezra A. Blount as his Co-Chairman. Functional sub-chairmen included: Mrs. Robert D. Miller and Mrs. W. Young (Ladies); R. K. Rarick (Finance); R. E. Winterman (Program); E. Roof (Registration); L. J. Howald (Publicity); R. D. Miller (Educational); R. A. Barry (Plant Visitation); A. R. Waters (Banquet); W. B. Stephenson Jr. (Educational); W. W. Loveless (Hotel); S. Chipman (Entertainment); A. J. Gerada (Athletic) and L. A. Critchfield (Coordination).

Numbering over a thousand registrants, the 45th Annual Convention produced this record and these results.

SUNDAY, MAY 18, 1958

The Executive Board met in full-day meeting and subdued a heavy Agenda of AES business. Groups that visited it for brief but fruitful conferences included the Cincinnati, Detroit and Los Angeles convention leaderships. Other meetings held that Sunday included the Credentials Committee and the AES Scientific Achievement Award Committee.

That same afternoon, Convention registration made a good start. The evening featured the Society's traditional get-together party with many present and reunion spirit high.

MONDAY, MAY 19, 1958

BLUM WINS HIGHEST AWARD

Before a packed Roof Garden of men and women of the AES family, General Convention Chairman Wise opened the 45th Annual Convention by calling upon Leonard A. Chesworth of the Boston Branch for the Invocation. The assembly was welcomed to Cincinnati by the municipality's Vice Mayor in the absence of Mayor Donald D. Clancy.

The brief address of National President Francis T. Eddy was followed by the introduction of Dr. Russel E. Harr, Chairman of the AES Scientific Achievement Award Committee, whose announcement that the first winner of the AES's newly created highest honor, the "AES Scientific Achievement Award," had been unanimously voted to Dr. William Blum met with tumultuous acclamation. Consequently, Dr. Blum will receive a $500 honorarium from the General Fund of the Society together with attendant honors, and will deliver the first "William Blum Lecture" at the opening Educational session of the Golden Jubilee Convention in Detroit in June 1959.

The Opening Session ended with a well-received illustrated talk on rocket engines by Louis Michelson, Manager, Rocket Engines, General Electric Company, Evendale, Ohio.

SUPREME SOCIETY'S FIRST SESSION

Aside from AES Branches present by proxy, 46 of the AES's 58 Branches were represented by some 105 accredited Delegates and Alternates at the First Business Session of the Supreme Society, the AES's summit governing council, that immediately followed the opening ceremonies, with National President Eddy himself in the chair. Delegates H. I. Littauer of Melbourne, Australia and Robert Isaacs of Sydney traveled farthest to attend. As one element of that business meeting of the Society's government, the assembly stood in a reverent moment of silence in tribute to the memory of some 35 members of 18 Branches who deceased during the immediately prior twelve-month period, including Past National Presidents Clarence L. Van Derau and E. Steen Thompson.

Dr. William Blum, facing, first winner of the AES Scientific Achievement Award, receives accolades of the Supreme Society

Crowded auditorium at the first business session of the Supreme Society on Monday

PAPER AWARD WINNERS ANNOUNCED

Dr. Henry L. Kellner, Paper Awards Committee Chairman, announced the following winners of the Society's 1957–1958 Paper Awards:

THE CARL HEUSSNER GOLD MEDAL AWARD to Dr. Abner Brenner and Dr. Clara de Minjer, both of the National Bureau of Standards for the paper, "Studies on Electroless Nickel Plating," that appeared in the December 1957 issue of PLATING MAGAZINE.

THE AES SILVER MEDAL to Spencer L. Henn and Ellsworth T. Candee of the Lea Manufacturing Company for the paper titled, "A Study of Application Techniques in the Use of Liquid Buffing Compounds," published in the 1957 issue of TECHNICAL PROCEEDINGS.

THE AES BRONZE MEDAL to Roy C. Spooner of Aluminum Laboratories, Inc., for the paper, "The Sealing of Sulfuric Acid Anodic Films on Aluminum," that appeared in the 1957 edition of TECHNICAL PROCEEDINGS.

THE ROBERT S. LEATHER AWARD to W. K. Seward of the Carborundum Company for the paper, "Taking the Guesswork out of Grinding and Polishing with Abrasive Belts," that appeared in the January issue of PLATING MAGAZINE.

In behalf of his Committee, Dr. Kellner said, "We are making no selections for the following Awards as in these cases less than the minimum number of papers were available for judging as stipulated under Section 3b of the Regulations: The Hogaboom Award; The Chromium Plating Award; The Precious Metal Plating Award and the John J. Hanney Memorial Award . . . The Paper Awards Committee for the following year should take into consideration the papers that appeared during this past 11-month period in making their selections for these awards next year."

STANDING COMMITTEE REPLACEMENTS NAMED

At that same meeting, President Eddy announced appointment by the Executive Board of the following to these Boards and Committees for respective three-year terms:

EDITORIAL BOARD: Robert A. Ehrhardt, Bell Telephone Laboratories; James H. Lindsay, General Motors Corp. and William H. Safranek, Battelle Memorial Institute

EDUCATIONAL COMMITTEE: Dr. John Kane, Canadian Arsenals, Ltd.; William P. Wisdom, Southwest Research Institute and Rafael Diaz, Westinghouse Electric Co.

MEMBERSHIP COMMITTEE: Manuel Ben, General Motors Corp.; Lester M. Reynolds, Reynolds Plastic Co. and George E. Best, Allied Chemical & Dye Corp.

PUBLICATIONS COMMITTEE: Dr. Vernon A. Lamb, U.S. Department of Commerce; Dr. Earl J. Serfass, Lehigh University and Dr. Samuel Heiman, Philadelphia Rust Proof Co.

PUBLIC RELATIONS COMMITTEE: Arthur G. Pierdon, Art Metal Finishing Co.; I. William Marcovitch, American Machine & Metals, Inc. and Frank Tirendi, Patent Button Co.

RESEARCH COMMITTEE: Raymond L. Mitchell, Mitchell-Bate Co.; Walter E. Moline, National Cash Register Co. and D. Gardner Foulke, Hanson-Van Winkle-Munning Co.

SCIENTIFIC ACHIEVEMENT AWARD COMMITTEE: Myron B. Diggin, Hanson-Van Winkle-Munning Co. and Dr. Louis Weisberg, Consultant

Two views of the Ladies Luncheon sponsored by Products Finishing

GOLDEN JUBILEE FLAG UNVEILED

The meeting heard and approved the report of the Credentials Committee presented by Edward M. Bruck, Chairman. Aside from receiving the reports of the six National Officers and of the Society's standing and special committees; the report on two new Branches installed during 1957–1958; the certified 1957–1958 audit statement and the proposed 1958–1959 AES/PLATING operating budget, the assembly viewed the AES's Golden Jubilee flag, one of two provided by the Detroit Convention/Exposition group for use by Branches during the Fiftieth Anniversary observance. Introduced to the meeting by National Executive Secretary John P. Nichols, Howard J. McAleer, Exposition Chairman, made the presentation. The flag was accepted in behalf of the AES by President Eddy for display and use during the Golden Jubilee celebration.

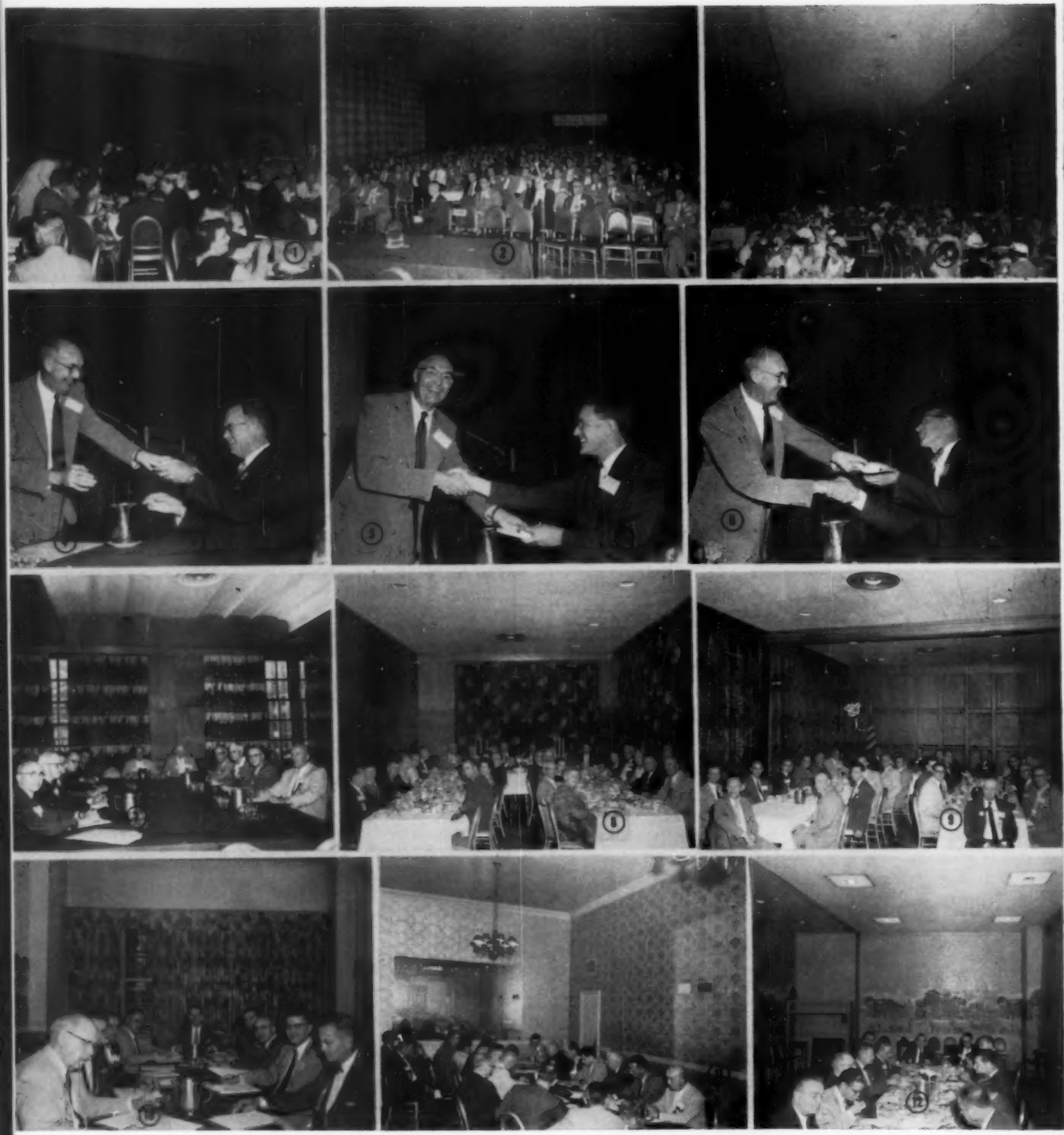
BRANCH SECRETARIES CEMENT MUTUALITY

Besides the Metal Finishing Suppliers' Association (MFSA) Luncheon and Annual Meeting held in the Ballroom and the well-attended "Aunt Ella" Luncheon sponsored by Oakite Products, Inc., and held in the Colony Restaurant in Swifton Village for the ladies, that day's midday period featured the banner Branch Secretaries Luncheon held in Parlors 4 and 5, with Executive Secretary Nichols in the chair.

With members of the Executive Board and a number of Branch Presidents also present, the large assembly of Branch Secretaries discussed many Branch subjects of mutual interest with mutual benefit, including the Branch Secretary's responsibility for providing Branch news to PLATING monthly as required by the Society's Bylaws. Apart from its publisher, PLATING was represented at the meeting by Rodney Leeds, Editor; Thomas W. Lowe, Production Manager and Ralph F. Scholbe, new Advertising Manager. The meeting enthusiastically discussed the observance of the AES's FIFTIETH ANNIVERSARY during the period from July 1, 1958 through June 30, 1959 and laid preliminary plans for earnest Branch cooperation.

COUCH HEADS MFSA IN 1958–1959

Meantime, the MFSA, at its noontime Annual Meeting, elected Earl W. Couch, President, Lea Manufacturing Co., as its President for 1958–1959, succeeding Dr. M. M. Beck-



(1) A corner of the Get-Together Party Sunday night in the Roof Garden. (2) The Educational Sessions were well attended as evidenced by this audience of platers. (3) AES Ladies enjoying one of their functions. (4) Dr. Henry L. Kellner presents the AES Silver Medal to Ellsworth T. Candee for paper on liquid buffing compounds, co-authored with Spencer L. Henn. (5) Fielding Ogburn accepts the Carl Heussner Gold Medal Award for Dr. Abner Brenner and Dr. Clara de Minjer, both were in Europe. (6) Dr. Roy E. Spooner receives from Dr. Kellner the AES Bronze Medal Award for his winning paper. (7) Meeting of the Order of Past Presidents. (8) Annual dinner of the Past Presidents and their wives and guests. (9) The Branch Secretaries luncheon. (10) Dr. Dodd S. Carr, center, conducting the meeting of the Educational Committee. (11) Editorial Board in session, Chairman Nichols presiding. (12) Membership Committee breakfast. Chairman Manuel Ben at the head of the table, sans glasses.

with of the Harshaw Chemical Co. And the National Association of Metal Finishers that same forenoon named George W. Taylor of the Production Plating Company of Adel, Georgia, to its helm succeeding John Palik Jr.

FIRST AES EDUCATIONAL SESSION

With John Holland, Arvin Industries, Inc. presiding, the Convention conducted its first Educational Session that same afternoon with a large crowd in attendance. Titled "Surface Preparation," speakers included Dr. Joseph B. Kushner; Bennie Cohen; Fred T. Hall and Dr. Maurice H. Jones and J. Zajdowski. Meanwhile, a plant inspection group visited and viewed the Cincinnati Milling Machine Company in operation as, in the Sheraton-Gibson's Parlor I, the Editorial Board held its full afternoon's m eting with Chairman John P. Nichols in the chair.

EDITORIAL BOARD IN RESULTFUL MEETING

The Editorial Board complimented its retiring members: Arthur W. Logozzo, Fremont L. Scott, John B. Capuano and Dr. Russel E. Harr for excellent service during their three-year terms and welcomed its new members. It extended Board commendation to Robert D. Miller, Host Branch Educational Chairman, for high-quality cooperation in planning and developing the 45th Annual Convention's Educational Sessions and extended its greetings to Walter L. Pinner, Detroit Host Branch Educational Chairman, who will serve on the Board during 1958–1959. It then finalized work remaining on the Cincinnati Convention, then proceeded to consider and act upon the preliminary plans for the Fifth International Conference on Electrodeposition and Metal Finishing to be held in Detroit as the educational phase of the Golden Jubilee Convention.

After congratulating Mr. Pinner on the quality of these plans of himself and his Vice Chairmen, namely Myron B. Diggin, Walter R. Meyer and Dr. Richard B. Saltonstall, the Board gave attention to the Los Angeles Convention Committee Educational Sessions Report brought to it by Earl Arnold, Host Branch Educational Chairman. Mr. Arnold was accompanied by Tony Stabile, General Convention Chairman, George J. Hetz, his Co-Chairman, and by Truman Stoner.

PAST PRESIDENTS UPGRADE JOHNSTON

The eventful day concluded with the business meeting, then dinner meeting, of the Order of Past Presidents at which Past President Samuel S. Johnston was elected President of the Order and Past President Samuel Heiman was named Secretary-Treasurer. That same evening, the AES family of members and their ladies were guests of the MFSA at a gala Open House.

TUESDAY, MAY 20, 1958

MEMBERSHIP COMMITTEE PROJECTS ACTION

A well-attended breakfast meeting of the Membership Committee at which all six National Officers were also present started the Convention's second official day. Committee Chairman Manuel Ben presided and much business was transacted, presaging an active and successful membership promotion year for the AES. Among projected action is the completion of a membership promotion booklet via which Branches can promote membership increases. It will be a companion piece to the Sustaining Member promotion booklet recently created by the AES Research Committee and now widely disseminated.

GOLDEN JUBILEE PLANS COORDINATED

While convention golfers were engaged in vying for supremacy in the MFSA Golf Tournament at the Kenwood Country Club, and while the Midwest Regional Council was in organizational session in Parlor 4 under the gavel of Chairman Leslie L. Diveley, the Society's Public Relations Committee, in Parlor I, launched work on plans for observing the Society's FIFTIETH ANNIVERSARY in 1958–1959. Actually, the Public Relations Committee was in joint session with the leadership of the Detroit Convention/Exposition and with the Executive Board because of the timely urgency of the subject under discussion.

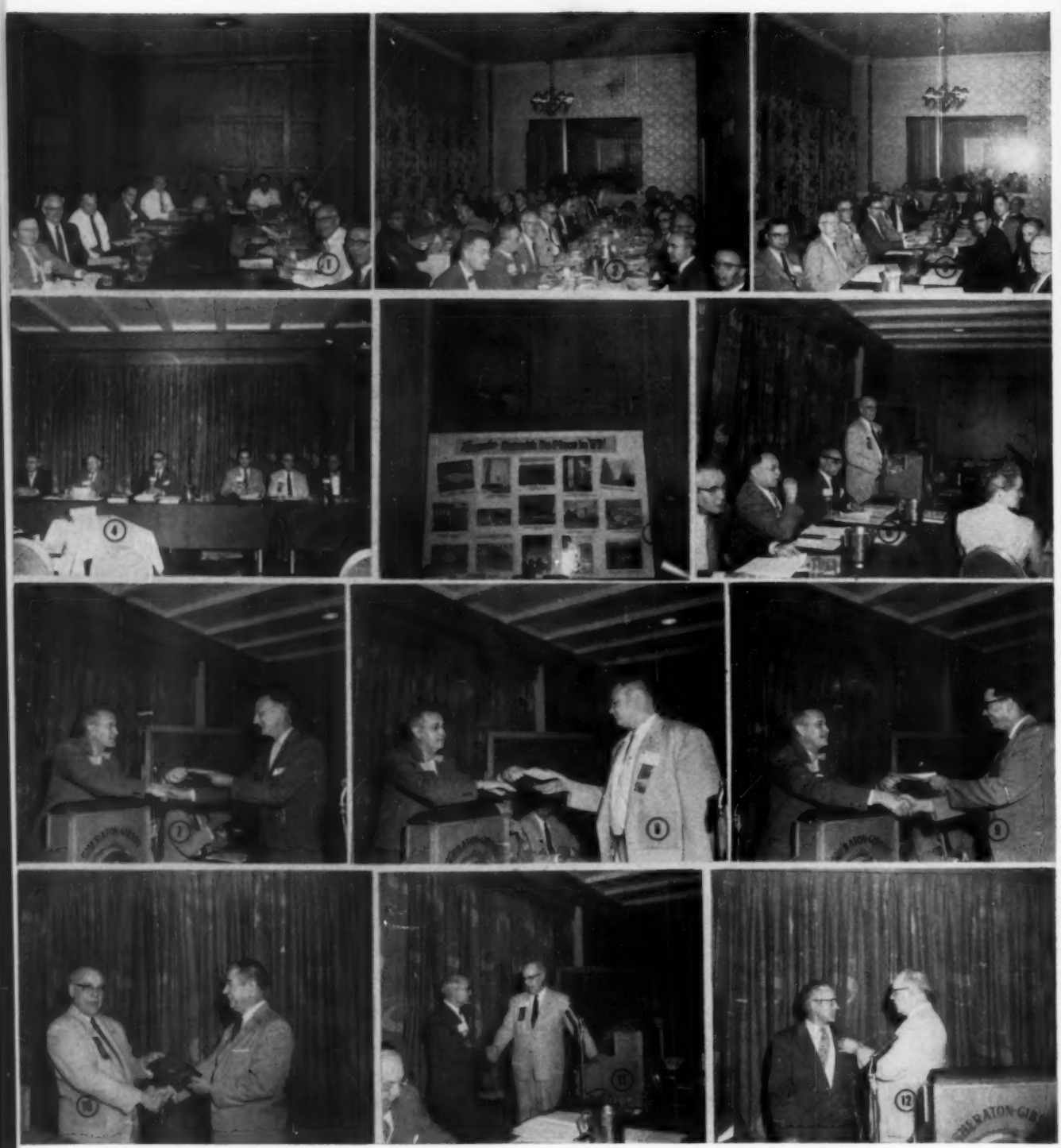
Aside from members of the Committee itself, the meeting was attended by Howard J. McAleer, Exposition Chairman; by Chairman W. L. Pinner and his Co-Chairmen M. B. Diggin and R. B. Saltonstall of the Educational Program; by Manuel Ben in dual capacity as Detroit Branch President and Co-Chairman of the Exposition, and by Robert C. Trees, Publicity Chairman of the Detroit Convention, Exposition and International Conference. Frank Tirendi, Public Relations Committee Chairman, presided.

The meeting heard from the foregoing respective leaders, the plans for the Golden Jubilee Convention and Exposition that will climax the AES's FIFTIETH ANNIVERSARY observance. These were highly lauded. From John P. Nichols, Secretary-Treasurer of the Committee and the AES's active public relations practitioner, it heard the Society's proposed plans for observing the Anniversary from July 1, 1958 to its Detroit climax, including the Golden Jubilee theme and insigne uniformly to be used; stationery; windshield decalcomania; Branch special events; visual aids, finally, the ambi-

(Top) Practical Plating Panel members, left to right, Harold F. Smith, Fremont L. Scott, Dr. Harold J. Read, Fred Keller, Lloyd O. Gilbert and Dr. A. Kenneth Graham. (Below) Intent audience at the popular panel discussion

tious Golden Jubilee Edition of PLATING MAGAZINE. It discussed preliminarily the AES/PLATING display that will be among the features of the Exposition.

In the end, the plan was unanimously passed with commendation, and referred to the Executive Board with recommendation that the Board approve and refer it to the Supreme Society with request that it (the Board) be authorized to expend whatever amount up to $20,000 may be needed from the Society's General Fund effectively to implement it. Finally, the Committee reelected Frank Tirendi as Chairman, Robert M. Norton as Vice Chairman.



(1) Meeting of the Midwest Regional Council. (2) The Research Committee Breakfast on Wednesday morning. (3) Research Committee in its morning session. (4) National officers at the start of the Supreme Society meeting on Thursday morning. From the left, Past President Samuel Heiman, Third Vice President W. Andrew Wesley, Executive Secretary John P. Nichols, President Francis T. Eddy, Second Vice President Herberth E. Head, Second Vice President Ralph D. Wysong. (5) Detroit shows why "Detroit's Da Place in '59." (6) New National Officers take their places at the dais, extreme left, Third Vice President Chester G. Borlet and, standing, President Herberth E. Head. (7, 8, 9) Second Vice President Wysong presenting the Membership Increase Competition awards to the official representatives of the winning Boston, Cincinnati and Kansas City Branches. (10) President Head makes presentation of the retiring President's plaque to Francis T. Eddy. (11) Retiring Past President Samuel Heiman receives words of appreciation for his long service as a National Officer from President Head. (12) Third Vice President Borlet receives the National Officers Pin from President Head.

SECOND EDUCATIONAL SESSION POPULAR

Elsewhere, Educational Session B was in progress with Past President William J. Neill wielding the gavel. It heard the papers delivered there by Fenton H. Dobb; Robert E. Anderson; Charles M. Tarzwell and Wayne L. Gasper. The Session was titled, "Waste Treatment and Disposal."

The forenoon's work completed, the entire Convention then migrated to Cincinnati's vaunted Coney Island for an afternoon's fun and relaxation.

Welcome to delegates from "Down Under." President Francis T. Eddy greets H. I. Littauer, Melbourne, Australia, while National Executive Secretary John P. Nichols extends greetings to Robert Isaacs of Sydney

WEDNESDAY, MAY 21, 1958

RESEARCH PERSONNEL BREAK BREAD

The traditional breakfast of the Research Committee started this eventful day with a full attendance of Committee members; District Supervisors; Project Chairmen and other key Research Program personnel. Chairman Robert A. Ehrhardt presided.

RESEARCH COMMITTEE PASSES BYLAWS AND BUDGET

A full-day's meeting of the Research Committee itself, together with District Supervisors, launched Wednesday's business sessions. The Committee not only adopted its new Bylaws, but also completed and approved its budget for the fiscal year, July 1, 1958–June 30, 1959. With Chairman Robert A. Ehrhardt at the helm, it conducted much other Research Program business, including decision to mount an effective Research Program display at the Golden Jubilee Convention and Exposition in Detroit in 1959. It welcomed its new members.

In the elections, Dr. Russel E. Harr was named Chairman to succeed Mr. Ehrhardt. The Committee designated James D. Thomas as Vice Chairman for Research and Kergan Wells as Vice Chairman for Finance. John P. Nichols continues as Secretary-Treasurer. Commendation was expressed to the Committee's retiring stalwarts, namely Mr. Ehrhardt, George E. Best and Walter R. Meyer. Later that day, the Committee's new Bylaws, having meantime been certified by the Law Committee, were ratified by the Executive Board at a Special Board meeting at which the Committee's 1958–1959 operating budget was also approved.

EDUCATIONAL COMMITTEE BLUEPRINTS PROGRAM

That same forenoon also found the Educational Committee in session with Dr. Dodd S. Carr, its Chairman, in the chair, aided by First Vice President Herberth E. Head, the Committee's Executive Board adviser. Its deliberations ran the gamut of the AES's educational program. Particular attention was placed upon streamlining the Speakers List and in providing recognition for men doing notable educational duty at national and Branch levels. The meeting was followed by a joint luncheon with Branch Librarians. Mr. Head served as presiding officer at the successful luncheon.

FOUR EDUCATIONAL SESSIONS DRAW CROWDS

Morning and afternoon dual educational sessions featured the day's educational menu. Dr. R. O. McDuffie presided at Session C whose theme was "Symposium on Electroplating Practices." Heard there were Fred G. Brune; Dr. Abraham M. Max; William P. Innes and Edward F. Foley.

At Session D, whose theme was "Specialized Finishes for Aircraft Components," speakers included Bruce E. Scott, Dr. Stanley Zirinsky and Dr. Dodd S. Carr, Dr. Harold J. Wiesner and Henry A. Meers, Donald R. Millage and Wilbur E. Hague, with Julius Teres serving as moderator.

Session E, "Symposium on Electroplating Practices," found Gerald A. Lux in the presiding chair with speakers including: Harold A. Kahler, Hugh V. McGuire and Frank J. Klein.

William H. Safranek was Chairman of Session F titled "Developments in Finishes and Controls." Papers were delivered there by Harris G. Beck, Fremont L. Scott and W. C. Hosford, and by Dr. W. M. Spurgeon, Ottis L. Isaacs and Samuel S. Frey.

"PRODUCTS FINISHING'S" LADIES' LUNCHEON

And while their menfolk were busily engaged either in Committee sessions or in educational enrichment, the ladies were partaking of relaxational fare at the well-attended luncheon in the Roof Garden of the Sheraton-Gibson sponsored by Products Finishing Magazine. But that evening, the entire convention participated in off-duty enjoyment by viewing the Floor Show and Dance provided by the Entertainment Committee, starring a fine bill headed by the well-known Hal LeRoy of stage and screen fame.

THURSDAY, MAY 22, 1958

PANEL SESSION A CONVENTION HIGHLIGHT

The Convention's innovation in educational treats occurred this forenoon. Spotlighting a panel program titled "Practical Plating Problems," it featured a question and answer session. Written questions provided by a packed roomful of AES members were answered, if possible and if time permitted, by a panel of experts on respective plating subjects including Dr. A. Kenneth Graham, Dr. Harold J. Read, Lloyd O. Gilbert, F. Keller, Harold F. Smith and Fremont L. Scott.

PLANT INSPECTIONS ENRICH KNOWLEDGE

That same forenoon, many members journeyed to the plant of the Plumbing and Heating Division of the American Radiator and Standard Sanitary Corporation and benefitted by inspecting it. And the ladies were the guests of the Udylite Corporation at an impressive luncheon at the Pavillon Caprice of the Netherland-Hilton Hotel. Later that day, another plant tour provided opportunity to view the workings of the Electric Auto-Lite Co. in Sharonville, Ohio. But for the Society's governors, namely its accredited Delegates and Alternates, the full day was a busy working day in AES government. With National President Francis T. Eddy in

The Opening Educational Session

Newly elected President Head addressing final Business Meeting

the chair, the Supreme Society met in full day's executive session.

GOVERNING COUNCIL TRANSACTS BUSINESS

Including Branches present by proxy, some 48 Branches were represented at the Second Business Session of the Supreme Society held in the Sheraton Hall of the Sheraton-Gibson. The following Past Presidents answered the roll call:

Frederick Fulforth	William J. Neill
Ellsworth T. Candee	George P. Swift
George J. Wagner	Ralph A. Schaefer
Walter L. Pinner	Clyde Kelly
Samuel S. Johnston	Samuel Heiman

As a tribute to the memory of Past President Franklyn J. MacStoker who had expired the prior day, the Supreme Society adopted a resolution unanimously expressing its grief and extolling the departed's service to the AES, and ordered it spread into that day's minutes, with a copy appropriately sent to the widow of the deceased. The meeting stood in a moment's mournful silence.

After approving the certified audit statement submitted by Clyde A. Zukswert & Co., the AES's independent certified public accounting company, covering the 1957–1958 fiscal year of the AES, PLATING MAGAZINE and the Research Program, it unanimously adopted a 1958–1959 operating budget, estimating consolidated AES/PLATING income at $236,140 and budgeting consolidated operating expenses for that period aggregating $233,940.

As winners of the Society's membership increase competition for 1957–1958 in their respective classes, the Boston Branch (First Division), Cincinnati (Second Division) and Kansas City (Third Division) were each awarded $50 prizes. The presentation was made by Ralph D. Wysong, Second Vice President.

In highlight, the Supreme Society also took the following other action:

Dr. William Blum, far right, installs 1958–1959 national officers: Past President Francis T. Eddy, Third Vice President Chester G. Borlet, Second Vice President W. Andrew Wesley, First Vice-President Ralph D. Wysong, President Herberth E. Head

1. It approved the so-called Hazucha Report providing for standards by which to measure qualifications for election to AES Honorary Membership and Awards of Merit, and instructed that the report be referred to the Law Committee for finalization as to language.
2. It approved the report of the Structure of the Society Committee and instructed the Executive Board to appoint a special committee to consider the need and duties of a so-called Planning Committee, said committee to report its conclusions to the Supreme Society at its Detroit meeting in June 1959.
3. It adopted the resolution of the Baltimore-Washington Branch providing that the Executive Board be instructed to appoint a six-man committee by October 1, 1959 to study its proposal for the creation of a so-called Convention Planning Committee, said six-man committee's final report to be included on the Agenda of the Supreme Society meeting to be held in Detroit next June.

Past Presidents stand at Supreme Society Meeting

4. It authorized the Executive Board to expend up to but not beyond $20,000 from the General Fund of the AES to implement the FIFTIETH ANNIVERSARY observance plan highlighted to the Supreme Society meeting that day as approved and recommended to the Executive Board by the Public Relations Committee, and as approved and, in turn, referred to the Supreme Society with recommendation by the Executive Board.
5. It ruled that for enactment of any measure referred by letter ballot to the Supreme Society by the Executive Board, signed letter ballots of a majority of accredited Delegates had to be returned and on hand before count. Two-thirds of such returned signed ballots favoring the referred proposition constituted enactment.
6. It made a number of streamlining amendments to the AES's Bylaws, notably in Part I, Article III, Section 4; Part I, Article III, Section 11; Part II, Article III, Section 4; Part II, Article VIII, Sections 1, 2, 3, 4

New President Herberth E. Head, right, presented with silver gavel by retiring President Francis T. Eddy

and Part I, Article V, Section 1. Mainly, these were corrections of language and deletions of unnecessary verbiage.

7. Effective in 1959, it amended its policy so as to allow documented Branch invitations to host Annual Conventions to be accepted six years in advance of Convention occurence instead of four as at present.
8. It applauded the generous action of the Metal Finishing Suppliers' Association projecting to give a $100 MFSA purse in the name of the MFSA's "Thomas A. Trombour Award" to each AES Branch chartered permanently by the AES after June 1, 1958. It ordered that a suitable letter of appreciation be submitted to the MFSA.
9. It ruled that no Industrial Finishing Exposition be held in Chicago in 1962 and instead approved the invitation of the Midwest Regional Council to host the 49th Annual Convention in Milwaukee in 1962.
10. It suspended its rules and approved the invitation of the Newark Branch to host the 50th Annual Convention in Atlantic City in 1963.

President and Mrs. Herberth E. Head at the banquet on the final night of the convention

11. It amended Part I, Article VI, Section 8 of the Bylaws thereby enabling the Executive Board to recommend to the Supreme Society, at its discretion, the conduct by the AES of a Convention with a concurrent Industrial Finishing Exposition.
12. It accepted the invitation of the Southeastern Branch to host the Sixth Interim Meeting in Atlanta, Georgia, next Winter.

Among other business, the Supreme Society unanimously adopted a resolution of commendation and appreciation to the Cincinnati Branch for its effort and results in conducting the 45th Annual Convention.

AES's 1958-1959 NATIONAL LEADERSHIP

In the annual elections that followed, Herberth E. Head, Chrysler Corporation, Detroit, was elected National President succeeding Francis T. Eddy, President, Technicraft Laboratories, Inc.

Ralph D. Wysong, Studebaker-Packard Corporation, was elected First Vice President; Dr. W. Andrew Wesley, International Nickel Company, was voted Second Vice President; Chester G. Borlet, Grand Rapids Brass Company, was unanimously elected Third Vice President.

The new Executive Board assembles for its first meeting. Left to right, Past President Francis T. Eddy, Second Vice President W. Andrew Wesley, First Vice President Ralph D. Wysong, President Herberth E. Head, Executive Secretary John P. Nichols, Third Vice President Chester G. Borlet

These officers, together with Mr. Eddy who ascended to the seat of immediate Past President on the Executive Board, were impressively installed by Dr. William Blum.

The traditional silver gavel of office was presented to President Head by retiring President Eddy who himself was then given his Past President's pin and his President's Plaque by the new President. Dr. Samuel Heiman, retiring from the Board after five years of fruitful AES service was warmly applauded as he retired to his seat in the Philadelphia delegation. As a new National Officer, Mr. Borlet was given his National Officers pin by which he and the five other national officers are now identified during tenure of office.

FAREWELL BANQUET ENDS CONVENTION

The 45th Annual Convention drew to an auspicious conclusion with a gala banquet and dance held in Pavilion Caprice of the Netherland-Hilton Hotel. And as the curtain fell upon the 45th Annual Convention, all AES eyes turned to the future—to the period ahead when a proud Society, in 1959, will observe its half-century of service to electroplating, metal finishing and allied arts.

CINCINNATI CONVENTION AND THE AES LADIES

by
FRANCES M. HOFFMAN
Cleveland, Ohio

Frances M. Hoffman
(Mrs. August R.)

Happy Memories, Ladies!

By this time, you have reached your own home and have settled down with that much-satisfied feeling that once again, you were a part of the best convention in 1958. Wasn't it fun? Now let us tell all the ladies who found it impossible to attend, in the very gay city of Cincinnati, filled with lovely ladies which made our visit so jolly.

The Get-Together Party on Sunday night was truly a huge success and one that will be long remembered. The Roof Garden was an ideal place for friendly greetings. Old friends were again reunited and new friends were added to the list. Dreamy music, combined with refreshing drinks and snacks, made a perfect Sunday Evening for all Early Birds who found it possible to arrive early. This activity has become a vital part of the convention.

WELCOME TO QUEEN CITY

The 45th Annual Convention was opened at 10 a.m. by General Chairman Charles Wise. He extended a formal welcome to the Delegates and members. Mrs. Robert D. Miller, the very gracious and capable Ladies Committee Chairman, welcomed the ladies to the Queen City. The ladies were very much interested in the "History-Making" of the AES, as it was here that the first AES Scientific Achievement Award was granted to Dr. William Blum. Dr. Blum will deliver the inaugural "William Blum Lecture" at the Society's Golden Jubilee Convention in Detroit in 1959. The keynote speaker at the Opening Session was Louis Michelson. He showed vivid slides of the first successful Vanguard launching.

Monday noon found all of us eager to board buses for the "Aunt Ella" Luncheon sponsored by Oakite Products, Inc. Our faithful host, Dave Clarin, took over the party, as usual, at the Colony Restaurant in Swifton Shopping Center. A delicious luncheon, plenty of music and a Style Show. The ladies left the party with many new ideas for the "Newest Look." They were delighted as they tucked away their bottle of "fragrance." Many thanks, Oakite Products, for again sharing Mr. Clarin with us.

Monday night brought the Metal Finishing Suppliers' Association famous Open House. From 9 p.m. until the wee hours of the morning, the Roof Garden lent itself to a perfect setting for food, music and fun, plus the generous Savings Bonds which were given to fortunate people who had the lucky numbers. The dancing revealed "prize winning dancers" and everyone had a glorious time. Thanks to the untiring efforts of the Master of Ceremonies and his fellow committee members, who were instrumental in making this "gala" affair so successful.

Tuesday again was filled with activities and much fun. The ladies were invited to participate in the Golf Tournament at Kenwood Country Club. At noon, they joined their husbands for a pleasant and relaxing afternoon at the Coney Island outing. First of all, we enjoyed a most delicious luncheon. With this strength and support, groups ventured to the places which appealed to them most. Swimming, square dancing, visiting the beautiful gardens, riding roller coasters and "just visiting," proved very delightful and the day was recorded in all memory books.

Wednesday was another day of much anticipation. The ladies were entertained in the Roof Garden at a luncheon sponsored by Products Finishing magazine. The Cincinnati ladies told us they had something new up their sleeves—and they really did! After a delicious luncheon, there were many beautiful gifts, jockeys riding their favorite horses, and much excitement. Yes, even the fishing proved to be a huge success. Ladies demonstrated new techniques in fishing (Not to be publicized!). A big "Thank You" goes to Products Finishing for making this lovely luncheon possible.

Wednesday evening was the traditional Floor Show and Dance. When we heard the ladies exclaim, "I could have danced all night," they really meant it!

Thursday noon, the ladies enjoyed another luncheon, sponsored by the Udylite Corporation, in the lovely setting of the Pavillon Caprice of the Netherland Hilton Hotel. Robert Trees again planned the "just right" luncheon and Dr. R. B. Saltonstall helped the ladies to better understand plating problems. Each year, the ladies look forward to this educational session. Dr. Saltonstall never fails to satisfy our yearning to advance our learning. This year, he told us all about why bumpers on our cars rust. He reviewed briefly some facts on corrosion of nickel-chromium, copper-nickel-chromium, and other combinations of plated coatings. A number of photomicrographs showing typical corrosion pits were projected on the screen. It seems that the physical characteristics and thickness of the chromium plate over bright nickel, as well as the conditions of plating, have striking effects on the protective value of the combination coatings. Proper application of these principles may well result in a marked improvement in quality of coatings intended for use under conditions of severe exposure. The ladies were grateful and wish to express their gratitude to the Udylite Corporation for sharing Mr. Trees and Dr. Saltonstall.

This delightful affair was followed with the much anticipated and lovely "Plato" party, with Mrs. Joan Wiarda as our gracious hostess. Joan always creates much excitement with the "Glitters" which she so carefully selects. With the shining silver gifts and the beautiful orchids from Rapid Electric Company, gifts from the Cincinnati ladies, we all hurried down to get ready for the Annual Banquet. This is, truly, a lovely and colorful event. The gifts, food, the orchestra, the prizes, together with all the wonderful people made this party a fitting closing for the 45th AES Annual Convention.

CONVENTION BECOMES MEMORY

Thus ended another convention, the best in 1958, filled with adventure and fun and many happy memories.

The ladies in attendance wish to thank Mrs. Robert D. Miller and her very able committee for making them so thoroughly happy during their stay in Cincinnati. We were fully aware of the hard work which took place before our arrival. We greatly appreciate the untiring efforts of the Cincinnati committee, which spelled "huge success." Again, in behalf of all the ladies who attended the convention, may I extend to Mrs. Miller and her committee a very sincere and grateful "Thank You," and may it be resolved that their friendliness, generosity, and hospitality be remembered as a vital part of the 45th Convention. It was truly superb!

Let's plan to meet again in Detroit in 1959. The Detroit ladies will be waiting!

AES NEWS

AES LAUNCHES ITS GOLDEN ANNIVERSARY OBSERVANCE

Created in 1909, The American Electroplaters' Society (AES) launched its Fiftieth Anniversary Observance on July 1, 1958, start of its fiscal year. The anniversary observance will gain momentum during the year and will be climaxed by the Society's Golden Jubilee Convention and Industrial Finishing Exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing, that the AES will conduct in Detroit, June 15–19, 1959 with the Detroit Branch as Host Branch.

During the Society's half-century anniversary observance, AES's Golden Jubilee insigne will proclaim the event far and wide on Headquarters, Branch and PLATING MAGAZINE anniversary stationery widely used. That insignium will also be employed on other anniversary media, possibly including windshield decalcomania.

Two Golden Anniversary flags will make the rounds of Regional and Branch events during the year-long observance serving as anniversary backdrop for the anniversary format of these functions. These affairs are expected to include Branch Annual Meetings; the Annual Educational Sessions of the Dixie, Empire State, Midwest, New England and Tri-State regional groups; the traditional "Order of the Pot" presentation of the Baltimore-Washington Branch, and the Sixth Interim Meeting of the Supreme Society next winter.

PLATING'S GOLDEN JUBILEE ISSUE

PLATING MAGAZINE will observe the anniversary of AES, its parent, with a sizable Golden Jubilee issue (June 1959) that is being beamed not only for current impact but also for long retainment both as an AES reference source and as a memento of this historic AES milestone. In addition, it will carry institutional as well as product advertising.

Anniversary momentum will reach apex during June 15–19, 1959 in Detroit where the AES will stage its Golden Jubilee Convention and Industrial Finishing Exposition under the aegis of its dynamic Detroit Branch.

A feature of the Golden Jubilee will be the Fifth International Conference on Electrodeposition and Metal Finishing. The Conference, as the Educational Sessions element of the Convention, will cover a five-day period and is presently being planned to include at least thirty technical and scientific papers which will be delivered by authorities from the United States and many other countries.

At the Opening Session, Dr. William Blum, the first winner of the AES's new Scientific Achievement Award, now the Society's highest award, will deliver the first "William Blum Lecture."

The Industrial Exposition, first since the successful Cleveland Exposition of 1955, will provide site for the display and demonstration of modern equipment, processes and materials in use in the metal finishing industry. Cooperating in this effort, it is conservatively estimated, will be over 175 participating companies using floor space in excess of 60,000 square feet. It is expected that the Exposition will attract at least 10,000 visitors. AES, PLATING and the AES Research Program will have suitable exhibits.

SUPREME SOCIETY RATIFIES PROGRAM

The AES's year-long Golden Jubilee observance program was approved at a meeting of the Public Relations Committee held during the recent Cincinnati Convention— a meeting also attended by the Executive Board plus the respective chairmen and /or co-chairmen of the Golden Jubilee Convention, Exposition and the International Conference (See photo below).

Upon passing that joint meeting with commendation and recommendation, the program was approved by the Executive Board the following day, and was unanimously ratified by the Annual Meeting of the Supreme Society, the AES's highest governing council, May 22, 1958. Watch PLATING for further developments and for news coverage as the program develops.

INTERNATIONAL ASPECTS OF DETROIT CONVENTION

Walter L. Pinner, chairman of the Educational Committee, reports that the International Council is making splendid progress in arranging the program of the Fifth International Conference on Electrodeposition and Metal Finishing to be held in Detroit in June 1959. This International Conference is a part of the Industrial Finishing Exposition and Golden Jubilee Convention of the AES,

The International Council, composed of five British Members of the Institute of Metal Finishing and four American Members of the AES, has definite commitments for 29 papers of which six are on subjects in the field of organic finishing. The other 23 papers are on subjects related to plating, corrosion and allied processes.

The listing of authors who have volunteered to submit papers would constitute a substantial "Who's-Who" of the Metal Finishing Industry of the world.

Eight manuscripts are promised from England, two from Canada, one from an author in Switzerland. Additionally, the British Members of the Council are confident that they can add three papers from Germany and one each from France, Holland, Italy and Belgium.

INDIANAPOLIS BRANCH CONTRIBUTES TO RESEARCH

Latest Branch to make a special contribution to the AES Research Program is Indianapolis that has just contributed $100. This brings to six the number of Branches that have generously contributed to the Research Fund over and above the "one dollar per member per fiscal year for research" included in the per capita tax fee of every AES member.

Aside from Indianapolis, the Branches are Cleveland ($500), Central Michigan ($100), Toronto ($100), Western Ontario ($100), and Detroit ($100).

BOOKS

Remittance must accompany all book orders placed with AES Headquarters.

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Light Metals and Alloys B-7—Compilation of ASTM Standards. 320 pp., Paper Cover. AES members $3.40; non-members $3.75.

This compilation of ASTM specifications and methods of test for light metals and alloys has been prepared to make these standards available in convenient form. It supersedes the December 1955 edition. It includes not only those specifications and methods of test which come under the jurisdiction of Committee B-7 on Light Metals and Alloys, but also those for light metal alloy die castings, prepared by Committee B-6 on Die Castings, and those for aluminum wire and cable for electrical purposes, sponsored by Committee B-1 on Wires for Electrical Conductors.

Several methods under the jurisdiction of Committee E-1 on Methods of Testing and Committee E-3 on Chemical Analysis of Metals have been added so that the compilation will be as useful as possible. In addition specifications for arc-welding electrodes and for brazing filler metal under the jurisdiction of the AWS-ASTM Joint Committee on Filler Metal have been included.

Among the general topics covered are: ingots; castings; bars, rods, wire, shapes; forgings; pipes, tubes; sheet, plate; wrought products, filler metal; and electroplating. There are 51 standards of which 36 are new, revised or have had their status recently changed.

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Ceramic Reinforced Alloys and Plated Cermets. By M. T. Curran and others, The New York State College of Ceramics for Wright Air Development Center, U. S. Air Force. May 1957. 49 pages. (Order PB 131188 directly from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., $1.25.)

A precision technique was developed for casting super alloys around ceramic rod reinforcement. Although the reinforced alloy had somewhat lower stress rupture life at 1800F than the alloy itself, there was indication that the ceramic contributed considerably to a decrease in deformation. Procedures were found for the electroplating of cermets with nickel and chromium to improve their impact resistance and for the chemical plating of nickel on titanium carbide grains. The effect of molybdenum as an alloying agent in the cermet binder was also observed.

FRANKLYN J. MacSTOKER

Franklyn J. MacStoker, one of the best known and best loved members of the American Electroplaters' Society, died on May 21 at the age of 71 after a short illness.

Mac, as he was known to his many friends, had been in charge of finishing specifications and production finishing for the Farrand Optical Instrument Corp. for the past ten years. He had been actively engaged in the Branch and National Affairs of the AES for over 35 years, and was an Honorary Member of the Supreme Society and the New York Branch.

A delegate to conventions since 1928, Mac had been Branch vice president and president, secretary-treasurer, and was National President of the AES in 1952. He was chairman of the Silver Jubilee Convention of the National Society held in New York City in 1937.

Survivors are his widow, Margaret; two sons, Robert and William; a daughter, Mary Vaeth; and two grandchildren.

Memorial to FRANKLYN J. MacSTOKER

WHEREAS Franklyn J. MacStoker, a member of the New York Branch of the American Electroplaters' Society, Inc. (AES) did in his lifetime render devoted service in plating to his employer and therefore to the electroplating industry.

WHEREAS As a Branch member and as a Branch officer, then as a member of the Executive Board, later as National President, he also did contribute greatly to the growth and development of said American Electroplaters' Society and to its mission of stimulating advancement in electroplating, metal finishing and allied arts.

WHEREAS By his dedication and other qualities of character, he won a host of friends who respected him in life and grieve him in death.

BE IT THEREFORE RESOLVED That this Supreme Society, governing council of the AES, does hereby record its bereavement over the passing of the deceased, and hereby orders that this testimony thereof be spread into the Minutes of this its May 22, 1958 meeting and, further, that a copy of this testimony be sent to the wife of the late departed with the sympathy of the membership and leadership of this Society over her great loss.

Supreme Society
American Electroplaters' Society, Inc.

James D. Thomas

Russel E. Harr

Kergan Wells

RESEARCH COMMITTEE'S 1958-1959 LEADERSHIP

Dr. Russel E. Harr, Western Electric Co., Chicago, has been elected Chairman of the AES's Research Committee succeeding Robert A. Ehrhardt. James D. Thomas, General Motors Corp., Detroit, is the Committee's Vice Chairman for Research succeeding Dr. Harr and Kergan Wells, W. W. Wells Ltd., Toronto, is Vice Chairman for Finance replacing George E. Best. John P. Nichols continues as Secretary-Treasurer.

Pitting in Ferrous Systems: An Annotated Bibliography. M. Benton, Naval Research Laboratory. June 1957. 129 pp. (Order PB 131006 directly from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., $3.25.)

References are given to 483 items of published information on pit formation. The data cover pitting in metals of all types, its causes, and means of preventing it. Included are references to information on stress and cavitation pitting on materials above and below ground, on ships, in buildings, in water and the atmosphere, and on the surface and inside of boilers and pipes. The period covered is 1866 to March 1957. Most of the references are briefly described.

San Francisco

Portland

Seattle-Puget Sound

British Columbia

WEST COAST BRANCH TOUR OF A NATIONAL PRESIDENT

The recent flying West Coast Branch tour of Past President Francis T. Eddy during the fading days of his administration as National President, a tenure that ended at the Supreme Society meeting in Cincinnati, May 22, 1958, is an example of the rigors and demands of the helm upon the Society's ranking officer.

On Saturday evening, April 12, then-President Eddy visited the Baltimore-Washington Branch's Annual Meeting and was awarded the "pot" of the Order of Past Presidents traditionally given to outgoing National Presidents.

From that meeting, he boarded a westbound plane and, during the next two weeks, visited, addressed and conferred at length with the officers and members of the AES's Los Angeles, San Francisco, Portland, Seattle-Washington and British Columbia (Vancouver) Branches. The photographs typify some of the group meetings at respective Branches.

At Los Angeles, then-President Eddy had opportunity to hear progress reports on the 1960 Annual Convention that the AES will conduct there with the enthusiastic Los Angeles Branch as host. In the photograph below (left) he is shown with Branch Officers; at right is the industrious Los Angeles Branch Convention Committee.

NATIONAL PRESIDENT AND LOS ANGELES BRANCH OFFICERS. Left to right, seated, George Magurean, past president; Norman McEwan, president; Francis T. Eddy, national president; Frank Virgil, second vice president. Standing, Truman Stoner and Ed Wells, board of managers; Harvey Hunt, librarian; Emmett Babcock, treasurer; Don Baudrand, secretary; George Hetz, first vice president.

1960 AES CONVENTION COMMITTEE. Seated, Earl Arnold, education; Tony Stabile, general chairman; George Hetz, co-chairman; Walter Behlendorf, finance. Standing, Ed Wells, publicity; Truman Stoner, outing and transportation; Larry Henderson, hotel; Harvey Hunt, plant visitation; Bill Thomas, banquet; G. S. Krentel, printing.

DETROIT EXPOSITION SHOWS PROGRESS

Howard J. McAleer, president of Formax Manufacturing Co. and general chairman of the 1959 Detroit Exposition of the American Electroplaters' Society, has just issued a progress report covering space reservations. This report reflects high interest in the Exposition and unusual early selling of exhibition space.

Although this Exposition at the Detroit Artillery Armory, June 15–19, 1959, is still a year away, already 73 exhibitors have reserved space totaling 19,000 square feet. This means that 57 per cent of the total space available has been sold.

Much of this enthusiastic advance space buying is due to the open layout with wide aisles which affords every exhibitor, no matter what location he chooses, a fine opportunity to display his products to good advantage. Many exhibitors are selecting spaces on the outer walls as there they are allowed background displays to a height of 16 feet.

Inquiries and applications for space should be directed to Mr. Howard J. McAleer, 3171 Bellevue, Detroit 7, Mich.

NATIONAL CONVENTION "DOWN BY THE SEA IN '63"

At its Cincinnati meeting, May 22, the Supreme Society designated Atlantic City, New Jersey as the site of the AES National Convention in 1963. The Newark Branch, observing its Fiftieth Anniversary that year, will be the Host Branch.

MILWAUKEE TO BE NATIONAL CONVENTION SITE IN 1962

The Midwest Regional Council was awarded the 1962 Annual Convention, to be held in Milwaukee, Wisconsin, by the Supreme Society at its meeting in Cincinnati, May 22. No Exposition will concurrently be held. The previously announced Industrial Finishing Exposition to be held in Chicago in 1962 will not be conducted. Above, the Midwest Regional Council at its finalization meeting during the Cincinnati Convention. Its Bylaws need yet to be ratified by the respective Branches composing it, including Chicago, Milwaukee, Mississippi Valley, Rockford, St. Joseph Valley, St. Louis and Twin City. Leslie L. Diveley of Milwaukee, third from left, is Chairman.

INTERSOCIETY NEWS

METAL EXPOSITION DATES ANNOUNCED

Dates of October 27 through 31 have been set for the 1958 National Metal Exposition and Congress, in Cleveland Public Auditorium, the sponsoring American Society for Metals has announced.

It will be the 40th annual version of this largest of industrial expositions and concurrent scientific gatherings and will be the Metal Show's 11th return to Cleveland Public Auditorium, with its 250,000 square feet of exhibit space.

TAYLOR ELECTED PRESIDENT OF NAMF

The convention of the National Association of Metal Finishers at Cincinnati's Sheraton-Gibson Hotel, May 18 to 20, was attended by nearly 100 persons.

Highlighting the 3-day convention were the presentation of a charter to the newly formed Tri-State Association of Metal Finishers, annual meeting of members, election of officers, four cost sessions of a management seminar which covered two days and included eight panelists, climaxed by the reception and banquet Tuesday evening.

The NAMF convention was opened by General Convention Chairman W. Wilson Loveless at 9:30 a.m., Sunday, with Secretary-Treasurer Frank Kaiser delivering the invocation. Reports by officers and committee chairmen took up most of the morning's program. Present for formal introduction were: Francis T. Eddy, president of the American Electroplaters' Society; Charles Wise, General Chairman, 45th AES Annual Convention; NAMF board and executive committee members.

In the afternoon, the newly elected board of directors met for the first time and acted upon many important items of business. A special resolution was passed paying tribute to former NAMF leader Paul E. Miller of Evansville, Ind., who died recently.

A meeting of representatives from NAMF local groups in the executive secretary's suite that evening climaxed the day's activities.

Members of the Executive Committee of both the National Association of Metal Finishers and Metal Finishing Suppliers' Association met for breakfast Monday morning, the first step in a closer working relationship between the two organizations. A luncheon meeting between the newly formed Tri-State Association of Metal Finishers and the NAMF Executive Committee was climaxed by the presentation of a charter to Tri-State prexy William Shriver of Columbus, Ohio, by George W. Taylor.

The first educational session and management seminar included two panelists whose topic was barrel rustproofing costs. Panelists: Glenn H. Friedt Jr., United Platers, Inc., Detroit; and Jack Wright, F. M. Callahan and Son, Malden, Mass. Moderator for this and the other sessions was A. T. Leonard, Superior Plating, Inc., Minneapolis.

Rack rustproofing costs was the subject of the second educational seminar. Panelists: J. W. Carlson, Arrow Plating Co., Chicago; and John Lietz, B. Mercil & Sons Plating Co., Chicago.

A New Yorker and an Ohioan led off Tuesday's educational session on decorative plating costs. They were Mariano Ranno, Imperial Plating Co., Brooklyn; and William F. Acks, Bechtel-McLaughlin, Inc., Sandusky.

George W. Taylor

The fourth and final educational session found two Clevelanders sharing the spotlight on hard chrome plating costs. They included John Hyduke, Durable Plating Co., and Duke L. Saas, Atlas Hard Chrome Service.

The Rev. Fay Le Meadows, nationally known speaker and radio luminary, addressed NAMF members and friends at the traditional banquet on the subject of "A Plater's Life Can Be Fun," marking a fitting climax to the three-day conclave. Mr. Le Meadow's timely topic which was inspirational and humorous, was received with much enthusiasm.

A highlight of the evening program was the surprise presentation of a handsome plaque to John Palik Jr. of Cleveland, Ohio, for his three outstanding years of leadership as NAMF president. The award was made by NAMF secretary-treasurer Frank Kaiser who also presented Mrs. Palik a floral bouquet.

George W. Taylor, president of Production Plating Co., Adel, Georgia, was named to the top post. He succeeds Mr. Palik. Mr. Taylor who is also president of D. & L. Plating Corporation, Carrollton, Ga., is active in the American Electroplaters' Society where he has held most Southeastern Branch offices, including that of president. He is a delegate to the AES Supreme Society and is presently a member of the AES Membership Committee.

A native of Huntsville, Alabama, Mr. Taylor attended public schools there, then matriculated at Jacksonville College, Florida. He is a 32° Mason and belongs to the local Shrine Temple and the BPOE. He served four years with Uncle Sam's fighting forces as an aviation mechanic II in the U. S. Navy, in World War II.

Married, Mr. Taylor lives with his wife, Helen, in Adel, Georgia.

Officers and Directors

Elected to serve with President Taylor were: First vice president, A. T. Leonard, Superior Plating, Inc., Minneapolis; second vice president, Harold W. Baker, Electro Galvanizing Co., Chicago, Ill.; secretary-treasurer, Frank Kaiser, Long Island Mechanical Plating Co., Woodside, N. Y.; assistant secretary-treasurer, Sal Novelli, Service Plating Co., Brooklyn, N. Y.; past president, John Palik Jr., National Plating Corporation, Cleveland, O.; directors: Harold E. Coombes, Crown City Plating Co., El Monte, Calif.; Ernest D. Callahan, F. M. Callahan and Son, Malden, Mass.; Amod Judd, Amos Judd and Sons, Baltimore, Md.; Curtis M. Varland, Varland Metal Service, Inc., Cincinnati, O.; John T. Hyduke, Durable Plating Co., Cleveland, O.; Lawrence J. Hay, Plating Service Co., Chicago, Ill.; Philip J. Ritzenthaler, Production Engineering Co., West Allis, Wisc.; Henry J. Siegel, Siegel-Robert Plating Co., St. Louis, Mo.; Charles N. Leva, Levco Metal Finishers, Inc., Long Island City, N. Y.; Edward N. Marlette, Marlette Plating Co., Buffalo, N. Y.; Webster B. Knight, Knight Plating Co., Detroit, Mich.

STANDARDS ENGINEERS WILL MEET IN PHILADELPHIA

The 7th Annual Meeting of the Standards Engineers Society will be held at the Benjamin Franklin Hotel, Philadelphia, Pa. on September 22, 23 and 24, 1958. The theme of the meeting will be, "Standardization—A Must for the Space Age."

To stimulate new ideas and to develop a top-quality program, the Annual Meeting Committee is sponsoring a technical paper contest in conjunction with the meeting. An award of $50 will be presented to the author of the winning paper and it will be published later in Standards Engineering, the official publication of the SES.

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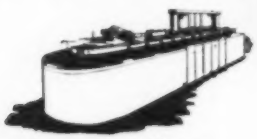

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Porosity of Electrodeposited Metals—By N. Thon, D. G. Kelemen, L. Yang, S. Yang, D. Dean — *Serial 28 Project 6* **85 Cents**

The Analysis of Electroplating Solutions for Major Constituents—By E. J. Serfass & M. H. Perry — *Serial 29 Project 2* **90 Cents**

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INDUSTRY NEWS

NEW MOLYBDENUM DEPOSITION PROCESSES DESCRIBED

New chemical processes for depositing molybdenum on other metals have opened the door to wider utilization of its favorable properties, according to Dr. H. W. Schultze, manager of New Chemical and Catalyst Development for Climax Molybdenum Co. Division, American Metal Climax, Inc.

Dr. H. W. Schultze

"With imaginative engineering, there is almost no limit to the scope of application for moly coatings produced by these new methods," Dr. Schultze told guests of Quantum, Incorporated's Industrial Symposium on New Materials and Their Fabrication, held on May 16 and 17 at Wallingford, Conn. Covering recent advances in all fields of molybdenum technology, his talk was highlighted by a detailed description of two deposition processes—hydrogen reduction of molybdenum pentachloride, and thermal decomposition of molybdenum hexacarbonyl.

The first process described by Dr. Schultze was the use of molybdenum pentachloride for vapor deposition of molybdenum. With hydrogen as the reducing agent, the reduction by-product is hydrogen chloride, which can be removed by means of a suitable pumping system without contaminating the reduced metal. When reduction temperatures around 850C are used, the resulting metal film is completely dense, with a well-developed grain structure. "The molybdenum produced by vapor deposition is very pure. Studies have shown that it can be deposited on other metals, ceramics, and graphite. It also has been found that the vapor-deposited molybdenum machines more easily and produces long curly chips due to its high ductility."

The process for producing vapor-deposited molybdenum with molybdenum pentachloride is run at reduced pressures —in the order of 20 mm Hg. Since molybdenum pentachloride melts at 194C and boils at 268C, vapors can be readily obtained. The process operates best when hydrogen is in a large excess.

Dr. Schultze cited tests conducted at Massachusetts Institute of Technology which show a high ductility for vapor deposited molybdenum. "Vapor deposited molybdenum has an extremely low oxygen content if care is taken in its preparation, and hence further annealing is not required if the only function is to remove oxygen," he said.

The second new method of coating with molybdenum discussed by Dr. Schultze was thermal decomposition of molybdenum hexacarbonyl, another vapor-phase process. This process produced molybdenum coatings of a quality approaching that produced by the pentachloride. Carbonyl deposition, although requiring careful engineering and control, can be modified to give coatings not only of molybdenum, but also molybdenum carbide or combinations of the two. Other molybdenum intermetallics can be deposited by varying the operating conditions.

In describing the process, Dr. Schultze explained that an enclosed system is necessary. The piece to be plated is cleaned and heated. Molybdenum hexacarbonyl vapors transported by carrier gases, pass over the heated piece where they decompose and deposit the metal. The by-product is carbon monoxide. By localized heating, selected areas can be plated—leading to economies in treating large pieces. Thickness of the metal deposit can be controlled.

ROTO-FINISH EXECUTIVES COMPLETE FLYING FIELD TRIP

Gunther Balz, vice president, and W. J. Walther, sales manager, Roto-Finish Co. of Kalamazoo, Mich., recently completed a tightly-scheduled 14-day field trip to major markets and points of distribution in Ontario and the eastern half of the United States.

They traveled by company plane and visited 15 metropolitan sales areas.

SELENIUM AND TELLURIUM RESEARCH AT BATTELLE

A research program to further understanding and use of selenium and tellurium is under way at Battelle Memorial Institute, sponsored by a group of producers of these nonmetallic elements. The group, known as the Selenium and Tellurium Development Committee, includes eight of the Western Hemisphere's major producers of these copper and lead by-products.

The committee's arrangement with the Columbus, Ohio, research center provides for a program to investigate and develop new uses for selenium and tellurium. According to Dr. Richard C. Himes, who is coordinating the work at Battelle, laboratory investigations aimed at the use of these elements in metals, organic chemicals, electrochemical solutions, and semiconductor devices have been scheduled. A number of very promising studies are already in progress.

Battelle and the companies financing the committee's work have been closely associated in the past on research involving selenium and tellurium. The research center has done extensive work on the semiconductor-properties of selenium and compounds of selenium and tellurium.

Walter C. Bennett, chairman of the board, Phelps Dodge Refining Corp., heads up the new committee; and John H. Schloen, manager of Canadian Copper Refiners Ltd. (subsidiary of Noranda Mines Ltd.), is chairman of the subcommittee that will provide technical liaison with Battelle scientists.

Corporations represented on the Selenium and Tellurium Development Committee include: American Metal Climax, Inc.; The Anaconda Co.; Cerro de Pasco Corp.; The International Nickel Co., Inc.; Kennecott Copper Corp.; Noranda Mines Ltd.; Phelps Dodge Refining Corp.; and United States Smelting, Refining and Mining Co.

MICRO DEBURRING ACQUIRES ILLINOIS DEBURRING

R. V. Leonardson, president of Micro Deburring Co., Chicago, has announced the purchase of plant, equipment and all other assets of the Illinois Deburring Co., also of Chicago.

All facilities are being consolidated at Micro Deburring's plant at 5827 W. Lake St. Key personnel of Illinois Deburring Co. are to be retained, Mr. Leonardson stated.

He said that the acquisition is part of an expansion program. Other steps he anticipates are relocation in larger quarters this fall, establishment of display facilities for barrel finishing materials and equipment, and the incorporation of a controlled used equipment sales department.

SCIENTIFIC PLATERS COMPLETE EXPANSION

Organization changes and expansion at Scientific Platers Inc., specialists in pre-

PREVIEW OF FUTURE PLATING ISSUES

●

AUGUST 1958

WATER AND WASTE TREATMENT. Another edition of this informative and popular feature.

●

NOVEMBER 1958

AIRCRAFT. Electroplating and metal finishing in the aviation industry will be featured in this second annual edition.

●

THE SEPTEMBER, OCTOBER and DECEMBER issues loom as strong 1958 General Issues.

●

JANUARY 1959

ABRASIVES AND MECHANICAL FINISHING. Developments in the various finishing methods will be featured in this annual issue.

●

MARCH 1959

ORGANIC COATING. The importance of organic finishing to electroplaters is increasing rapidly. New and review material will be presented.

●

JUNE 1959

GOLDEN JUBILEE. A large feature issue climaxing the Fiftieth Anniversary observance of the American Electroplaters' Society, PLATING's parent, it will be targeted both for immediate interest to PLATING's global circulation and for long retainment as an AES reference source and as a memento of this year-long observance.

cision hard chrome plating by the Morey Process, have been completed. Mr. Van Caudill has been appointed general manager of the plant and Abraham Hovsepian, president, will continue to handle the administrative duties as well as the technical engineering services.

Installation of new Morey Process precision hard chrome plating equipment to supplement the present equipment has been completed, including a 15-foot tank designed for precision hard chrome plating to extremely close tolerances.

Mr. Van Caudill came to Scientific Platers from Chrome Electro Forming Co. in Detroit, Mich., with over 15 years of plating experience. His work in Detroit included extensive travel throughout the Midwest.

Mr. Hovsepian, member of the AES and ASTE and a graduate mechanical engineer from Wayne State University in Detroit, now handles the administrative and technical aspects of size plating in addition to the design and installation of Morey equipment for industrial users in their own shops.

Field coverage has been expanded through the offices of Weightman & Associates, manufacturers representatives. They represent Scientific Platers in both plating and plating equipment. E. Swan and Glen Brown handle the Southern California area out of the Burbank office and G. West has the Bay area from the Menlo Park, Calif., office.

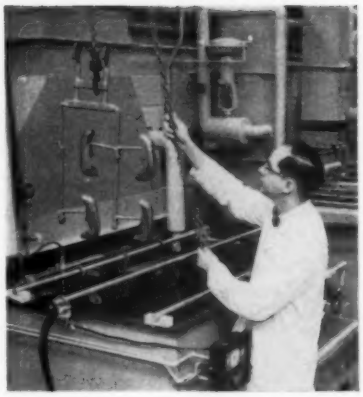
DUPONT OPENS NEW LABORATORY

The new $5 million laboratory to provide service to customers and for evaluation of new or improved products of the DuPont Company's Electrochemicals and Pigments departments was opened on May 21.

Although some facilities are shared jointly by the two departments, the building houses separate laboratories for product development in the paint, metals, textile, plastics, paper, ink, and allied chemical fields.

For both departments, the laboratory provides a center for research work on problems of customers, for customer visits, development work on new products and new uses for established products and training of field technical representatives. Sales service facilities for the electrochemicals department formerly were maintained at its Niagara Falls plant. Prior to the completion of the new building, the pigments department operated separate service laboratories at Newark, N. J. and at its Newport, Del. plant.

The laboratory contains 81,000 sq ft of floor space, including 150 separate rooms, laboratories, and demonstration areas. The technically trained staff of 130 includes chemists, chemical engineers, metallurgists, and other specialists.



Electroplating automobile bumper guards in new DuPont laboratory.

The Electrochemicals wing is divided into four major product areas—peroxygen, vinyl, sodium and chlorine. Seventeen individual laboratories are grouped around large demonstration areas in which there is extensive equipment which duplicates customers' operations on a semi-works scale.

A 75-foot-long degreaser, only one of its kind, incorporates major features of various types of commercial vapor degreasing machinery, testing performance of Triclene trichlorethylene in metal cleaning. Electroplating, descaling and steel heat-treating equipment provide facilities for evaluating end uses for sodium products, including a new high speed copper plating process announced recently.

Maximum use of color and many products of both departments have been incorporated in the building. In the Pigments wing, walls and floor tiles of various colors are used to distinguish the separate work areas. The lunch room and conference room in the electrochemicals wing are panelled with porcelain-coated aluminum tiles.

ENTHONE PRODUCTS MANUFACTURED IN ITALY

Enthone, Inc. of New Haven, Conn., a subsidiary of American Smelting and Refining Co., has licensed Compagnia Italiana Galvanotecnica of Milano to manufacture, distribute and service the complete line of Enthone metal finishing chemicals in Italy. The Italian firm is well known in the plating industry and has a staff of engineers and chemists to provide technical assistance in the use of Enthone products. Their headquarters is at Viale Pasubio 8 in Milano.

With the completion of this arrangement, Enthone products are now manufactured in five European countries and distributed throughout Western Europe. In addition to Italy, manufacturing is conducted by firms in England, France, Sweden and West Germany.

Harry Irvin, left, president of Allied Research Products, and his new administrative assistant, Joe Wagner.

ALLIED RESEARCH AND WAGNER BROTHERS MERGE

In an expansion move aimed at providing a more complete service and broader, more comprehensive product development for the metal finishing industry, Allied Research Products, Inc. of Baltimore and Wagner Brothers, Inc. of Detroit have merged. Allied acquired the metal finishing operational assets and products of Wagner Brothers. Included in the transaction was the sale of some of Allied's common stock to Wagner. Wagner Brothers is now disassociated from the metal finishing field but continues to operate its subsidiary, Automatic Molding Machine Co., Inc.

Through the merged operations, Allied Research now offers a complete line of chemical and electrochemical processes, anodes, rectifiers, automatic equipment and supplies for metal finishing. In jointly announcing the merged operations, H. C. Irvin, president of Allied Research, and J. R. Wagner, president of Wagner Brothers and now administrative assistant to Mr. Irvin, emphasized that the key personnel of both companies will continue in the same general functions to assure uninterrupted and improved service on all products.

Allied's headquarters operations are in Baltimore at 4004 East Monument Street while branch administrative offices have been established at 400 Midland Avenue, Detroit. Other facilities provided by the combine include manufacturing in one plant in Baltimore and three in Detroit with research and pilot plant facilities in both cities. Sales representatives and distributors cover the nation and Canada with district sales headquarters located in Baltimore, Chicago, Detroit and Bridgeport, Conn. Warehouses are located in leading industrial centers from coast to coast. The company also has licensees on the West Coast and in Europe and exports direct to other countries not yet covered by license arrangements.

Allied Research Products, Inc., stems from work which was begun in 1941 by the Rheem Manufacturing Company, resulting in a totally owned research and development subsidiary known as Rheem Products, Inc.

This company became Allied Research Products, Inc. in 1947, when the Rheem interest was bought out and an independent operation established. In 1951, two subsidiary corporations were formed, Allied Research Sales Corporation as a national marketing organization and Allied Metal Finishing Corporation as a metal finishing job shop, the largest on the East Coast south of Philadelphia. In the years since 1947, Allied Research has grown rapidly.

Wagner Brothers, Inc. was established as a partnership in 1940 and was incorporated in 1946. While Allied has specialized in chemical treatments for metals, Wagner has been more active in supplies, chemicals and equipment for the metal finishing industry.

The combination of these two organizations provides broader line of products than was previously offered by either. At the same time, it provides broadened facilities and personnel for research and development and a stronger customer service organization.

KELITE HOLDING REGIONAL SALES CONFERENCES

Kelite Corp. held an Eastern Regional sales conference on May 23 and 24 at its Berkeley Heights, N. J. plant. All sales personnel from the Eastern Region attended.

William Sorensen, Kelite's marketing director, states that the meeting is part of a new conference plan inaugurated this year. Under the new system, semi-annual sales conferences are being held at each of Kelite's four U.S. Regions. In addition, an annual meeting is held for sales management personnel and members

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Insist on Triangle Brand Copper Sulfate and Nickel Sulfate for dependable plating baths.

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PLATERS

1—8000/4000 AMPERE, 6/12 VOLT. **CHANDEYSSON,** Synch.
1—7500/3750 AMPERE, 9/18 VOLT. **H-VW-M,** Synchronous.
1—7500/3750 AMPERE, 6/12 VOLT, 25° C., **CHANDEYSSON,** Synch.
1—6000/3000 AMPERE, 6/12 VOLT. **ELETRIC PRODUCTS,** Synch.
1—5000/2500 AMPERE, 9/18 VOLT. **CHANDEYSSON,** Synch. Exciter-in-head.
1—5000/2500 AMPERE, 6/12 VOLT, 25° C., **CHANDEYSSON,** Synch.
1—4000/2000 AMPERE, 12/24 VOLT, 25° C., **CHANDEYSSON,** Synch.
1—4000/2000 AMPERE, 6/12 VOLT. **H-VW-M,** Synch., Exc.-in-head.
3—3000/1500 AMPERE, 12/24 VOLT. **CHANDEYSSON,** Exciter-in-head.
1—2000/1000 AMPERE, 6/12 VOLT. **HANSON-VAN WINKLE-MUNNING.**
1—1500/750 AMPERE, 12/24 VOLT. **CHANDEYSSON,** Synchronous.

ANODIZERS

1—1000 AMPERE, 40 VOLT, **CHANDEYSSON,** 25/ C.
1—1000 AMPERE, 30 VOLT. **IDEAL,** Exciter-in-head.
1—750 AMPERE, 60 VOLT. **HANSON-VAN WINKLE-MUNNING,** Synchronous, Exciter-in-head.
1—500 AMPERE, 25 VOLT, **CHANDEYSSON,** Synchronous, Exciter-in-head.
4—400 AMPERE, 40 VOLT, **M. G. C.,** Separately Excited.

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1—**SEL-REX** SELENIUM, 1200 AMPS., 9V, for 440/3/60.
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4—**UDYLITE-MALLORY,** 1440/720 AMPERE, 6/12 VOLT.
1—**RAPID** 1500 AMPERE, 9 VOLT, Germanium Remote AVS 220/440/3/60.
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1—**RAPID** 750 Amp., 6 V Selenium, Remote Control, 440/3/60 AC.

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2—**CROWN & H-VW-M** Centrifugal Driers No. 1 and No. 2 with Heat.
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Kelite sales personnel at recent Key Club meeting and sales management conference at Ponte Vedra Beach, Florida.

of Kelite's Key Club, comprised of sales engineers who have produced the top sales volume during the previous fiscal year.

A joint Key Club meeting and sales management conference was held at a Ponte Vedra Beach, Fla., resort on Feb. 9 to 11. At the meeting, President L. C. Sorensen presented sterling silver Paul Revere bowls to Key Club "repeaters" and wrist watches to the "first-timers." A highlight of the following sales management conference was a talk on "Metal Finishing Defects, Their Causes and Identification," by Dr. A. K. Graham, president of the consulting chemical engineering firm of Graham, Savage and Associates, and a member of Kelite's Board of Directors.

The Western Regional conference was held at the Los Angeles headquarters, on March 7 and 8. A sales conference for all Southern Regional sales personnel was held April 11 and 12 at Dallas, Texas.

DIAMOND ALKALI HELPS DEDICATE HOLLAND PLANT

Raymond F. Evans, chairman and president of Diamond Alkali Co., Cleveland, Ohio, recently participated in the dedication by the Netherlands Government of a new chemical facility designed, engineered and built with the technical assistance and cooperation of this chemicals producer.

Queen Juliana dedicated Holland's first soda ash plant. The plant is located at Delfzijl on the Eems estuary near the country's northern coast.

As part of the ceremony, Diamond's chief executive officer presented to officials of the new plant a specially designed wall plaque handcrafted from aluminum and glass—two basic "end products" made with the aid of soda ash.

In cooperation with Zola G. Deutsch, consulting engineer of New York, Diamond Alkali engineers since 1954 have worked with Nederlandse Soda Industrie of Holland in the design and construction of this important new chemical facility.

The plant, financed jointly by private and state funds, is based on an enormous salt deposit (estimated at 20-billion tons) discovered shortly following World War II near Winschoten in the northern part of the Dutch province of Groningen. The plant is located some 20 miles away at Delfzijl.

ENGELBERG NAME CHANGE ANNOUNCED

John T. Schenck, president of the Engelberg Huller Company, Inc., announced that the company name has now been changed to Engelberg, Inc. Reason for the change, Mr. Schenck stated, is the growth of the firm's abrasive belt grinder division, which last year accounted for about 80 per cent of total sales.

Since it was first acquired from Porter Cable in 1953, the company's line of abrasive belt machines has been completely redesigned and constantly expanded. The most notable developments have been new multiple-head conveyor-type machines which permit as many as six operations in the time formerly required for one.

The word "Huller," on the other hand, refers to the company's Rice and Coffee Machinery Division, which manufactures rice and coffee hullers. With belt grinder sales running far ahead of rice and coffee equipment sales, the word "Huller," Mr. Schenck explained, has become something of a misnomer. Furthermore, in the likely event that the company eventually broadens its operations to include one or more new manufacturing divisions, the name Huller would become even more irrelevant.

COMMERCIAL FILTERS ACQUIRES INDUSTRIAL FILTRATION

Commercial Filters Corp., a subsidiary of Ogden Corp., has acquired the Industrial Filtration Co., manufacturers of Delpark filters.

Robert L. Fielding, president of Commercial Filters, announced that Delpark will operate as a part of Indiana Commercial Filters Corp. with headquarters in Lebanon, Indiana.

Commercial Filters products now include Fulflo, CFC and Delpark Filters.

INDUSTRY NEWS BRIEFS

SBA LISTS SMALL FIRMS FOR GOVERNMENT CONTRACT BIDS

Wendell B. Barnes, administrator of the Small Business Administration, in an effort to increase small business participation in Government research and development work, has announced his agency has compiled a list of 1,100 small firms that would like to bid on Government contracts.

In making public the list, which has been supplied to the procurement offices of the Department of Defense and other Government offices, Mr. Barnes said that many small firms are qualified for research and development for the Government. He continued: "The amount of federal expenditure for research and development work has been increasing steadily, and it is estimated that contracts for this purpose are approximately $2,782,000,000 for this fiscal year."

Mr. Barnes explained that by making the list of 1,100 available to the Government procurement offices they will be expected to notify firms on the list when the Government is interested in receiving bids on services they may be able to offer. The companies are located in all parts of the United States. They are listed alphabetically with a brief description of the type of research and development work each is interested in.

Periodical revision of the list is planned, Mr. Barnes said, in urging all small firms desiring to be included in the list to communicate with their nearest Small Business Administration office.

JONES AND LAUGHLIN MARK TIN PLATE COATING

The Jones and Laughlin Steel Corp. has installed a new marking device to designate quickly the heavy coated from the light-coated side of the differentially-coated tin plate produced at their Aliquippa Works. Through a method similar to that used in offset printing, diamond shaped symbols can be "printed" on either side. Following the plating operation and just before the strip enters the brightening tower, an oxidizing solution is used to make the mark.

NEW MOLYBDENUM PLANT TO BE BUILT IN MICHIGAN

Construction of a $1,000,000 plant for the production of molybdenum metal and molybdenum-base alloys has been announced by Arthur H. Bunker, chairman of American Metal Climax, Inc. Initial production will be largely material to be used for guided missile components.

Situated at Coldwater, Michigan, the plant will be owned and operated by Climax Molybdenum Company of Michigan, a wholly-owned subsidiary of American Metal Climax. At the outset the facility will occupy a single-story building with floor space of 23,000 sq ft. It is scheduled to go into initial production in the third quarter of 1958.

NICKEL IN 1957

Free-world mine production of nickel continued its uptrend for the seventh consecutive year to establish a new high of about 260,000 short tons in 1957, up about 13 per cent over 1956. Of the 1957 total, Canada produced about 73 per cent, New Caledonia 13 per cent, Cuba 8 per cent, and the United States 4 per cent.

HOOKER ELECTROCHEMICAL SHORTENS NAME

The Hooker Electrochemical Company, Niagara Falls, N. Y., has shortened its name to Hooker Chemical Corp. to reflect more accurately the change in the products it manufactures.

The change became effective recently with the merger of the Shea Chemical Corporation of Boston Mass., into Hooker. The stockholders of both companies approved the transaction which involves the exchange of more than $23 million in Hooker stock for all the outstanding Shea stock.

Barrel Nickel Plating

●

The song says "Summer time and the living is easy." To anyone doing plating summer is the time when all the help is thinking about everything but work. Now is the time to get all the cycles running right and eliminate the extra costs. Vacations mean extended shutdowns of solutions and equipment and care should be used to prepare for the shutdown. Barrels should be thoroughly rinsed and steel greased to prevent rust. Acid dips should be dumped to prevent fumes. Plating solutions should be covered to prevent evaporation and keep dirt out. Polyethylene sheet is inexpensive and very satisfactory. It can even be allowed to float on the solution and need not be supported.

●

Solutions themselves require little care for shutdown. If help is available shutdown periods are useful for filtering, purifying and other maintenance on the solutions. And of course, don't forget to check your supplies and order what you will need when you start up. There probably won't be any time to think of it then.

●

True Brite Nickel Brightener remains the same quality as always. We believe it still represents the standard by which to judge any other barrel nickel brightener. The results are good, the cost of use is low and the materials are all stable over long periods of time so that only routine purification from severe contamination is ever necessary. Iron precipitates as fast as it is introduced. Only infrequent filtration (carbon not usually necessary) and occasional dummy plating is necessary. It has to be True-Brite Nickel Brightener to get all the advantages.

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EQUIPMENT AND SUPPLIES

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E—701. Rod Insulator—A new type of electrode rod insulator of single-bolt construction has been developed by Davies Supply and Manufacturing Co.

Known as the Uni-Bolt, the one-piece insulator is available in a variety of sizes. It is constructed of heavy steel, with stainless steel bolt, and is covered with a heavy coating of plastisol. Design of the insulator provides automatic insulation, with no spacer required. It can be used on tanks for alkaline, acid and oxidizing solutions, and is said to be completely resistant to liquid absorption.

E—702. Temperature control valves—A new plastic coated sensing bulb and thermal system is now available with all OPW-Jordan sliding gate temperature control valves for use in plating tanks, chemical tanks or heaters, and other corrosive applications. The entire thermal bulb and capillary tubing system is heavily coated with a protective, heat conducting plastic film. It is claimed to afford economical corrosion resistance to a broad variety of chemicals and is suitable for temperatures up to 185F. The capillary tubing is available in 8 ft, 15 ft and special lengths.

E—703. Titanium Parts—The Imperial Rack Co. is now manufacturing a complete line of parts for rack use from titanium. Compared to other metals, use of these parts is claimed to show a considerable increase in the life of anodized racks. These commercially pure titanium parts and stampings can be assembled without special welding equipment according to the company. The parts also do not have to be coated as they are reported to resist corrosion in plating solutions.

The company offers complete design and manufacturing facilities for racks to specific requirements.

E—704. Copper Process—Jelco Finishing Equipment Corp. has introduced Cop-Brite, a one-material bright barrel copper process. A high-speed bright copper operates under normal barrel plating conditions with standard solution and has a range from room temperature to 150F. No cyanide fumes are given off. This is the only brightener required and results in soft ductile deposit, which can be used for heat treating according to the company.

It can be used with standard barrel facilities, current source 5–12 v. Steel or rubber lined tanks can be used. Typical applications are on hardware, novelties and castings, on metals such as steel, zinc, aluminum, brass, etc.

E—705. Lead Anode—Republic Lead Equipment Co. has just introduced a new round chromium plating lead anode.

Republic's new anodes are hollow, thus effecting substantial savings in weight as well as in cost, according to the company.

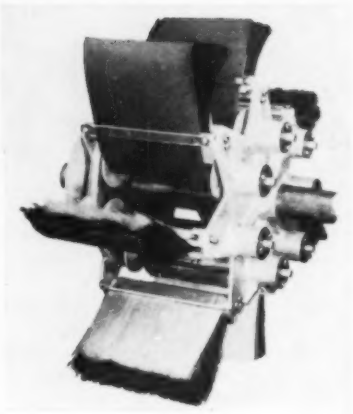
The key to the new design is the method used to attach the hook to the hollow anode. The anode is flattened and the hook homogeneously burned to the anode.

The bond formed is claimed to last the life of the anode. Burning the hook directly to the anode makes it possible to provide a vent hole well above the solution level to vent gases and fumes.

Republic hollow round lead anodes are made in two sizes: 1½ and 2 in. o.d. with wall thickness of ¼ and ⅜ in. respectively. Length as specified. They can be provided with any one of six hook styles.

E—706. Reverse Current Cleaner—Oakite Composition No. 190, the new reverse current cleaner, has just been made available by Oakite Products, Inc.

Providing greater conductivity and surface activity, cleaner No. 190 is said to be particularly effective in cleaning heavily smutted steel. It also removes fingerprints, light surface rust and oxides resulting from spot or seam welding. The material is used at concentrations from 8 to 16 oz/gal of water, at temperatures ranging from 180 to 200F., with reverse current, from 40 to 100 amps/sq ft. It may be used with or without a precleaner and rinses well in hot or cold water.



E—707. Abrasive Head—A new coated abrasive head for finishing metals and woods carries a supply of abrasive for replenishing worn material.

Designed to use either cloth or paper backed silica carbide or aluminum oxide abrasive, the material is fed from rolls which are automatically advanced by manual or solenoid activation.

The Smooth-O-Matic head is available from Abrasive Machinery Corp. It may be used in portable tools or in permanent mountings. These units are adaptable to automated operations when contours and flat surfaces alike require scratch finishes ranging from satin to coarse finishes.

Heads are available in abrasive widths of 2 to 50 in. Motor speed recommended 750 rpm.

E—708. Surface Pyrometer—The new Model DR35 Pyro surface pyrometer is a double range instrument designed for plant and laboratory surface and subsurface temperature measurements alike. The 4¾ in. indicator has two scale ranges in different colors; the low range from 0–500F is drawn in black and is subdivided into 5 divisions; whereas the high range is calibrated in contrasting red from 0–1500F. Temperature readings on both scales can be easily interpolated to within a fine fraction of each division according to the manufacturer. The range selector switch is located to permit the operator to change from one scale to the other by a flick of a finger.

The meter automatically corrects itself for changes in room temperature on both scales. It is constructed in a dust, moisture and shock resistant shielded steel housing and is available with a selection of 15 different types of interchangeable thermocouples as well as flexible and rigid extension arms.

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3 NEW WAYS TO CUT YOUR BUFFING AND POLISHING COSTS

STEVENS 58 L LIQUID TRIPOLI

An outstanding *all purpose* liquid tripoli suitable for buffing all non-ferrous metals including die castings, copper plate, brass, and aluminum. Your *best* bet for low-cost, high volume metal finishing.

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Now . . . most STEVENS compounds are available in "NO-NUBBIN" false bottom containers. These money-saving packages are supplied in three sizes, 2″x 2″– 2″x 4″– 2″x 6″– and mean big economy in your buffing and polishing operations.

STEVENS 27 L LIQUID TRIPOLI COLORING

The *best* liquid tripoli coloring on the market today, new STEVENS 27 L gives very high color and is readily cleaned. Another big advantage in 27 L Liquid Tripoli is its consistency in viscosity.

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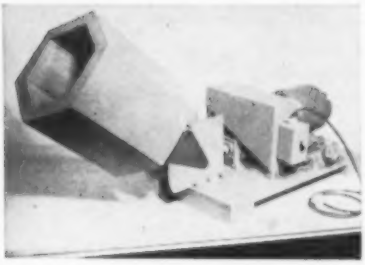


E—709. Bench Barrel—The Poly Finish Corp. announces a new, variable angle oblique bench barrel. Ruggedly built for continuous duty, the machine plugs into a 110 v, ac outlet. The motor is protected by an overload starting switch. Barrel sizes are 8 in. and 10 in. detachable wood, unlined steel and vinyl-lined steel. This finisher is available in fixed, three or variable speeds.

E—710. Pentachloride—Molybdenum Pentachloride ($MoCl_5$), an active catalytic agent, is now being produced in semi-works quantities by Climax Molybdenum Co., a division of American Metal Climax, Inc. This versatile chemical is also a plating compound and a reactive intermediate.

As a catalyst, $MoCl_5$ is effective in the chlorination of aromatics and in alkylations of the Friedel-Crafts type, according to the producer. With alkyl and aryl Grignard reagents, the corresponding bialkyl and biaryl compounds are formed.

Metals and ceramics can be plated with molybdenum metal by the hydrogen reduction of molybdenum pentachloride.

E—711. Abrasive Machine—The Versa-Mite is a new all purpose 7 in 1 machine now available from Curtis Machine Division, The Carborundum Co.

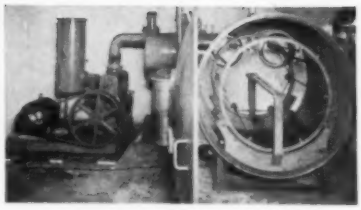
It is a bench type machine incorporating a fast cutting abrasive belt, and a serrated contact wheel. A coated abrasive disc fastened to the side of the contact wheel and a tilting adjustable table permit square and angle grinding as well as chamfering and surfacing.

Abrasive belt extension arms can be mounted on both ends of the motor for roughing and finishing with one handling of the material.

Flat surfacing applications are done on the platen, mounted on the extension arm. Inside diameters or radius sanding or finishing is accomplished by using a coated abrasive sleeve on an expanding rubber drum.

Grinding wheels, wire brushes or buffiing wheels can be mounted on either side of the motor.

E—712. Metalizing Unit—Extremely rapid pumping cycles, in the order of a minute and a half, are claimed for a



production coating unit manufactured by Vacuum Specialties Company Inc. due to the 16 in. high vacuum valves. The entire volume and surface area of the valves are never exposed to the atmosphere. This results in no pumping or outgassing time for this substantial volume and area. It also provides a large high vacuum ballast volume.

This valve design permits cleaning the interior of the unit through a handhole with a caustic spray. Caustic fumes are vented outdoors.

The vacuum cycle is semi-automatically contolled by a single rotary selector switch operating fail-safe pneumatic vacuum valves.

E—713. Paint Stripper—A conveyorized paint stripping system, incorporating the Kolene molten salt bath process, makes it possible to strip paint from hooks and racks when required, without costly tie-up of the paint production line it is reported. Designed and manufactured by Kolene

The KOCOUR SULFATE TEST SET with ELECTRIC CENTRIFUGE

. . . determines sulfate content in a chromium plating bath . . . directions are easy to follow . . . no calculations necessary . . . readings are directly in ounces per gallon.

● KOCOUR are specialists and pioneers in testing equipment for controlling plating — cleaning — pickling — anodizing — and hardening processes . . . special sets can be provided for your requirements.

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VAPOR-PLATING

The Formation of Metallic and Refractory Coatings by Vapor Deposition

By C. F. POWELL, I. E. CAMPBELL, and B. W. GONSER, all at the Battelle Memorial Institute.

1955. 158 pages. Illus.
$5.50.
AES Members $4.60

This is the first single source of reference for data and information on these processes. Provides a critical and authoritative review of the applications and techniques of vapor deposition of metals and non-metals.

The versatility of vapor-plating processes is stressed by the authors in an effort to stimulate the use of these processes as a flexible tool in many fields of technology. Sponsored by THE ELECTROCHEMICAL SOCIETY.

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445 BROAD STREET NEWARK 2, N. J.

Corp., the system features automatic, adjustable time cycling. This enables one man to both load and unload, at the same station, paint-laden hooks and racks from multiple conveyor lines. Stripping time averages one to three minutes.

Inventory of hooks and racks can be reduced to a minimum because it is not necessary to carry a backlog of fixtures while stripping. Continuous 24-hour stripping can be maintained.

E—714. Strippable Coating—Guard Coatings Corp., announced two strippable coatings, Metalguards S-5119 and S-5219, designed specifically for outdoor protection of stainless steel and aluminum architectural metalwork, during erection and construction as well as during shipment and storage.

They are plastic solutions in organic solvents which on air drying are reported to form tough, flexible and strippable films. These films have outstanding resistance to degradation when exposed for long periods to all extremes of weather, according to the company and having excellent abrasion resistance, act as barriers to and are not attacked by water, moisture, chemicals and chemical fumes.

These coatings find application wherever temporary protection of metals, glass, ceramics, marble and tile against plaster, mortar and muriatic acid or scratches is required. They are said to remain easily strippable for more than one year when applied at recommended film thickness.

E—715. Epoxy Stripper—Enthone, Inc. has announced the development of a nonflammable, cold solvent stripper for epoxy enamels. Known as enamel stripper S-16, the new product is designed to strip many of the newer epoxy resins which are usually very difficult to remove.

The items being stripped are immersed in the undiluted stripper at room temperature. The epoxy enamel is rapidly wrinkled and detached from the base metal whereupon it falls to the bottom of the stripping tank or may be flushed off in a subsequent cold water rinse. There is no attack of most commonly used base metals such as steel, aluminum, copper and brass in the short times usually required for complete stripping, it is reported.

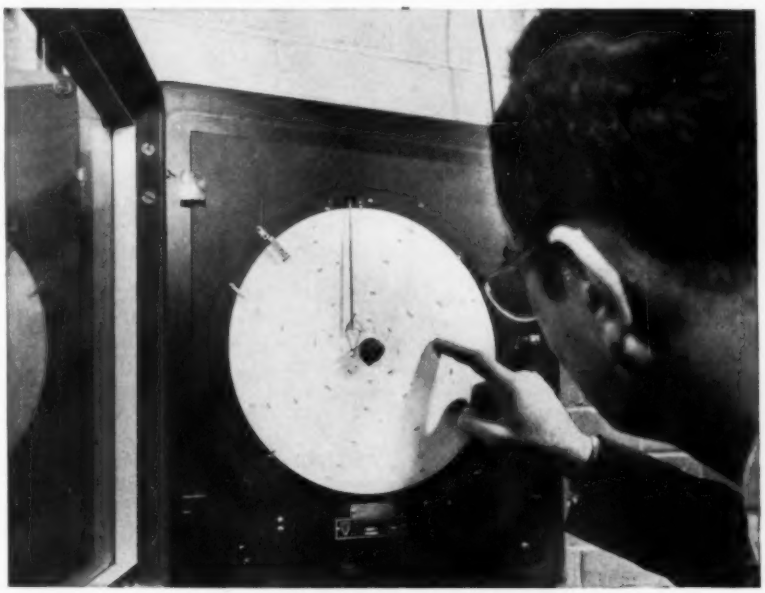
E—716. Chromate Products. Heatbath Corp. introduces two new chromate products, Duracoat 27 and 27L. These two products are used to produce a clear bright finish on cadmium plate with complete freedom from iridescence. Leaching is not required. Working solutions are made up using 3½ ounces of Duracoat No. 27 per gal resulting in a very low cost operation. The products are supplied as powder or liquid.

E—717. Disposable Uniforms—Textile Products announces the availability of disposable garments. Industrial type uniforms, such as laboratory coats, jackets, aprons, shirts and pants are now being manufactured by them. According to the company, these garments can be used at very low cost.

Wiping cloths that will absorb nine to ten times their weight in water and seven to eight times their weight in oil are also available. These are an all cotton cloth product and have a tensile strength of approximately 5 to 7½ lb/in.

E—718. Bed Support—An anion unit bed support that eliminates the need for subfill media and substantially reduces final anion unit rinse requirements is available from Graver Water Conditioning Co.

This design provides for the replacement of subfill media by specially designed anion unit lower internals. These lower internals, similar to those used in mixed-bed demineralizers, incorporate a unique corrosion resistant bed support medium which allows the passage of water in either direction while retaining the resin. The bed support also provides for uniform collection and distribution over the entire cross sectional area of the unit.



The best way to know the results of your industrial waste treatment is to have a permanent record. The kind you get with a W&T O-R-P system

WALLACE & TIERNAN O-R-P SYSTEM... the sure way to treat poisonous plating wastes

The destruction of cyanides with alkaline chlorination is a controlled certainty. A W&T Oxidation-Reduction Potential (O-R-P) system, automatically controls waste treatment and records the results.

Why use an automatic system? Because there is no overfeeding of chemical; no uncertainty of effluent safety. An O-R-P system samples the treated waste, controls the feeding of the treatment chemicals and records the effectiveness of the treating process.

That's why the sure way of treating your industrial waste effectively is with an O-R-P controlling and recording system. To get the O-R-P story and learn how it works in a major industrial plant, write for Bulletin I-63.75

WALLACE & TIERNAN INCORPORATED

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 732.

L—701. Data Book—A new condensed 12-page catalogue listing the entire line of Permacel-Lepage's Inc. tapes and adhesives has just been released by the company.

Easy-to-read tables give a brief description of each product, its outstanding properties and its application. In addition, government specifications, tensile strength and price list references are listed. A cross-index of the company's products and competitive products are also included, complete with stock number of the comparable items.

Tapes are broken down into basic classifications which include cloth, paper, plastic, metal foils, double-faced, reinforced, thermoplastic and laminates. There are also sections devoted to refinishing products and industrial adhesives.

L—702. Alkaline Cleaning—Pfanstiehl Laboratories has recently issued a new data sheet on Seqlene for alkaline derusting and descaling metals, especially steel. The process can also be used before painting and enameling. The data sheet gives solution strength per gallon and conditions for effective use.

L—703. Vibrating Feeders—The Cleveland Vibrator Co. is offering a new illustrated bulletin covering their line of air-operated vibrating feeders.

Lengths and feeding rates are listed. The smaller feeders move 250 lb of small metal parts per hour, while the larger ones move 200 tons of damp sand per hour. Other feeders are described which will move anything from dry cement, or similar fine powder, to 65 lb castings according to the bulletin. The most popular shaped feeder is the U-shaped cross section.

Along with the bulletin which contains photos and data on eight different feeders, is an information sheet.

L—704. Holiday Detector—Data sheets describing their holiday detector are available from Tinker and Rasor, manufacturers of electrical testing equipment. Photographs and diagrams showing a set-up on a water cooled coating machine are included for Model J1ACM. This detector was designed principally to be used as an inspection device on coating and wrapping machines which use water for cooling purposes. An alarm is set off and a spray marks the spot where the holiday or faulty spot in the coating exists.

Model EP is used for large and small diameter pipe as well as for flat surfaces when such surfaces are sprayed, brushed, dipped or wrapped in a high electrical resistance material. When pin-holes, voids, breaks or burned spots in protective coatings, such as plating tank linings, are encountered by the inspecting electrode, a bell signal is actuated in the instrument.

L—705. Immersion Heaters—Comprehensive immersion water heater literature has been prepared by Sellers Engineering Co.

Some of the subjects covered are: What about this Business of Immersion Heating? design features; advantages; installation costs; draft problems; Gas in Summer, Steam in Winter.

L—706. Barrel Finishing—The Baird Machine Co. has just issued a completely revised edition of its catalog-data book on barrel finishing machines and tumbling barrels. New machines detailed in this book include Baird barrel finishing machines equipped with either electratilt push button tilting controls or hydratilt, manual-hydraulic controls. Barrel equipment includes steam heated, electrically heated and drainage types for all media.

Also listed and detailed are a wide range of both oblique tilting and horizontal machines ranging from bench models to the largest standard sizes, and including ball burnishing machines. Included are preliminary details on new developments in special multiple horizontal high-production barrel finishing machines.

L—707. Zinc—The American Zinc Institute, Inc. has just published its revised basic text on zinc, entitled "Zinc—A Mine to Market Outline." The 96-page book describes in concise form a wide variety of fundamental data on zinc's history, sources, production, significant properties, and important applications.

Fully illustrated with photographs, charts, graphs and drawings, "Zinc—A Mine to Market Outline" describes comprehensively the full scope of the zinc industry, including many new and unfamiliar aspects of the metal. The book has been updated to include latest research and production findings of value to management, production and design engineers, and students.

L—708. Ultrasonic Cleaning—"Ultrasonic Cleaning," a new illustrated booklet, is now available from Branson Ultrasonic Corp. The 24-page Bulletin, S-200, explains practical applications and basic principles of this modern cleaning method, as well as design of equipment.

Many areas in which ultrasonic cleaning is advantageous are covered in some detail.

Design information occupies a large part of the booklet. Under general system considerations, batch immersion, conveyor and multi-stage systems are discussed, along with various transducer arrangements. Information on solutions and chemicals recommended for ultrasonic cleaning is also included.

A number of methods of evaluating performance are given. There is also a section on cleaning principles.

L—709. Filtration—The Alsop Engineering Corp. has just released a brochure dealing with sub-micron filtration and its contribution to cost reduction in metalworking.

The booklet, titled "12 Avenues to Metalworking Cost Reduction," covers such areas of cost reduction as increased production, improved finish and controlled accuracy of work piece, reduction of coolant waste, longer tool or abrasive wheel life expenctancy, reduced wheel loading and wheel dressing and others.

Also described is the filtration equipment recommended to solve the 12 metalworking problems that result from improper or no filtration.

L—710. Burring—A new 8-page technical bulletin on flexible burring utilizing Lea Compound and methods has been issued by The Lea Manufacturing Co., Comprehensive instructions on the use of compound, methods of finishing and a list of compounds and types of burr for specific items are included.

L—711. Cleaners and Acidic Solution—A comprehensive line of cleaners designed for use in power spray washing machines is described in technical data sheet No. 7, a five-page usage and instruction sheet prepared by MacDermid Inc. The group of cleaners covers a range of variables such as basis metal; type of soil; water; time, temperature, pressure and volume of solution; and related finishing operations.

A new acidic solution for producing bright luster on non-silicon aluminum alloys is fully described in MacDermid's two-page technical data sheet No. 55. Use of Metex Electropolish BA is said to result in an improved and brightened finish, burr removal without mechanical or manual operations, and a substantial reduction in buffing and polishing time. In many cases, parts processed with Metex Electropolish BA require no further treatment. An inexpensive operation, electropolishing improves adhesion when plating on aluminum is to be done, and results in clearer brighter finished coatings when aluminum is electropolished before anodizing.

PATENT ABSTRACTS

DR. D. GARDNER FOULKE
Manager, Electrochemical Development
Hanson-Van Winkle-Munning Co
Matawan, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,825,697, March 4, 1958—Surface Treatment of Aluminum—J. Carroll and N. Newhard, assignors to American Chemical Paint Co., Ambler, Pa.

A method of increasing the corrosion resistance of aluminum without changing its appearance consists of treating the surface with an aqueous acid solution consisting essentially of hexavalent chromium and a soluble complex fluorine-bearing compound. The hexavalent chromium compound being 0.4 to 4 g/l is CrO^3 and the fluorine compound being 0.1 to 1.0 g/l as fluorine. The *p*H is 2.0 to 4.0.

2 claims.

No. 2,826,541, 3/11/58—Making Ceramic Clad Metal Structures—James Shyne, et al., assignors to Vitro Corp. of America, Verona, N. J.

The production of carmet structure is described wherein the ceramic is deposited on a molybdenum substrate by electrophoreses. See also No. 2,826,542, assigned to Vitro by Shyne and Scheible, concerned with electrophoretically depositing the sulfides and disulfides of molybdenum, tungsten, titanium and uranium along with a reducible compound (7 claims).

8 claims.

No. 2,826,880, 3/18/58—Buffiing Cooling Mechanism—J. Wisnieski and W. Martin, assignors to Lyon, Inc., Detroit, Mich.

In an air cooled buffing machine, a housing having an internal bore, a drive shaft rotatably mounted in said bore having an axially extending air passage intermediate opposite end of said drive shaft, a buffiing wheel structure carried on said shaft in overlying relation to said generally axial air passage, a plurality of generally radial air passages between said axial air passage and said buff structure for cooling same, axially spaced shaft seal assemblies between said drive shaft and said housing, a compressed air chamber disposed generally axially between said shaft seal assemblies and generally radially between said drive shaft and said housing with said chamber having a compressed air inlet, at least one generally radial passageway between said axial shaft air passage and said compressed air chamber with air moving from said compressed air inlet through the chamber into the passage in the shaft and then along the passage and out through the radial air passages for cooling the buffing wheel structure.

7 claims.

No. 2,827,398, 3/18/58—Electroless Iron Plating—P. Eisenberg, assignor to Sylvania Electric Products, Inc., Mass.

To deposit iron on a metallic substrate use a solution containing a ferrous salt (30 g/l), a hypophosphite (10 g/l) and a buffening and sequestering agent (25–100 g/l) (oxalic, citric acids and salts and Rochelle Salts) in a basic condition. See also No. 2,827,399 on electroless deposition of iron alloys with 5 claims,

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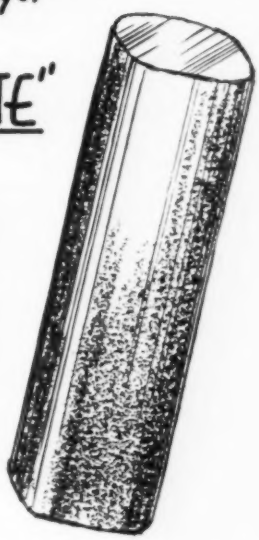

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and No. 2,827,400 on electroless deposition of vanadium with 5 claims and No. 2,828,227, with 5 claims on vanadium alloy. Electroless chromium plating (11 claims) is described in No 2,828,059, using hypophosphite also.

5 claims.

No. 2,827,402, 3/18/58—Pickling Titanium—G. Albers and W. Stephenson Jr., assignors to General Electric Co., New York.

The article is immersed in an aqueous solution of sulfuric acid and calcium fluoride until the scale is converted to a gray film which is removed by treatment in mineral acid.

6 claims.

No. 2,827,410, 3/18/58—Electrolytic Refining of Lead—F. Mathers, et al., assignors to U.S. Smelting and Refining Co., Boston, Mass.

Refining lead from a fluosilicate bath is helped by adding per lb of lead deposited 0.1–5.0 lb of goalac and 3.0–0.1 lb of soluble chestnut extract.

8 claims.

No. 2,827,425, 3/18/58—Protective Coatings on Iron Articles—R. McGlasson and F. Radd, assignors to Continental Oil Co., Ponca City, Okla.

Claim 1 states: "The process of forming a protective coating on an iron object which comprises immersing said iron object as one electrode in an aqueous solution of an electrolyte the *p*H of which is not less than four and wherein the cations of said electrolyte are selected from groups 1 and 2 of the periodic table having specific gravities of less than four, immersing another conductor in said solution as a second electrode at a distance apart from said first-mentioned electrode, connecting said electrodes to a source of direct current such that said first-mentioned electrode is negative and said second electrode is positive, allowing a direct current to flow between said electrodes for a period of time until the surface of said first-mentioned electrode is activated by electrically released hydrogen, reversing the polarity of said electrodes until a layer composed of ferrous and ferric hydroxides is formed on said iron object and cyclically repeating said process whereby said iron object is first made cathode and then anode at least once and then converting the said layer of mixed hydroxides to ferric oxide, wherein the cathode-anode time ratio in respect to the iron object is about 3:2.

10 claims.

No. 2,828,192, 3/25/58—Etching Metals—W. Langsfeld, assignor to Turco Products, Inc., Los Angeles, Calif.

The process consists of immersing the workpiece in an etching solution carrying a layer of froth, drawing the work piece out through the froth while directing moist air towards work piece at a point below the froth.

2 claims, figure.

No. 2,828,193, 3/25/58—Aluminum Treating Solutions—K. Newman, assignor to Turco Products, Inc., Los Angeles, Calif.

Claim 1 states: "In a method of treating aluminum objects having a surface layer of metal compounds thereon to remove said compounds, wherein said compounds are removed by contacting said surface layer with an aqueous acidic solution containing fluoride ions, said solution being adapted to react with and dissolve said layer without appreciably corroding the aluminum objects; the improvement of revivifying said solution, after treatment and removal of said aluminum objects from the bath, by increasing the free fluoride concentration thereof above that existing during the metal compound dissolving procedure to a concentration corrosive to aluminum objects by adding to said solution a free fluoride ion yielding compound in an amount substantially equal to the amount of said compound stoichiometrically equivalent to the dissolved metal ions present in the solution, to precipitate substantially all the dissolved metal ions from said solution in combination with the additional fluoride ions.

3 claims.

No. 2,828,250, 3/25/58—Electrolytic Oxidation of Copper Wire—D. Hurd, assignor to General Electric Co., New York.

A method and apparatus for anodizing copper wire using an alkaline electrolyte is described wherein the voltage increased by pulsing and the current between anode and cathode momentarily shorted out.

6 claims, figure.

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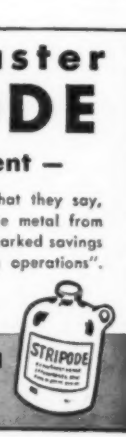

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PERSONALS

W. K. Murray

E. B. Washburn

C. Schaefer

W. R.Schmidtke

William K. Murray has been promoted to manager of customer service by Enthone, Inc. of New Haven, Conn., a subsidiary of American Smelting and Refining Co.

Mr. Murray joined Enthone in 1953 as technical service engineer and became supervisor of the technical service laboratory in 1954. He is a graduate of Rensselaer Polytechnic Institute and was associated with Wallace Silversmiths in Wallingford, Conn., prior to connecting with Enthone. He is a past president of the New Haven Branch of the AES and a member of the American Society for Metals.

In his new capacity, Mr. Murray will have charge of sales promotion, publicity and technical service.

Edward B. Washburn recently joined Enthone to succeed Mr. Murray as supervisor of the technical service laboratory.

Mr. Washburn is a graduate of Brown University where he majored in chemistry. For many years he was supervisor of finishing operations and plant chemist at McKinney Manufacturing Co., Pittsburgh, Pa. Most recently, he was superintendent of finishing at Waterbury Manufacturing Division, Chase Brass & Copper Co., Waterbury, Conn.

In the AES, Mr. Washburn is a past president of the Pittsburgh Branch and was a second vice president of the Newark Branch. He is presently a member of the Waterbury Branch where he is serving on the Bylaws Committee.

Carl Schaefer has joined Enthone as production manager and purchasing agent.

Mr. Schaefer has had over 20 years of experience in the metal finishing industry. Prior to joining Enthone he was manager of metal finishing at Casco Products Corp., Bridgeport, Conn. He is a graduate of the University of Michigan and a member of the Electrochemical Society, Society of Plastics Engineers and ASTM. He is a past president of the Bridgeport Branch of the AES.

William R. Schmidtke has been appointed assistant office manager and safety director. He was with American Smelting's New York office.

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DEMAND, internationally, for copies of the recently published 1957 Edition of the AES's book, TECHNICAL PROCEEDINGS, is gaining momentum. Hence, the Society's limited remaining supply is fast diminishing.

Containing each of the technical papers delivered before the AES's 44th Annual Convention held in Montreal, Canada, June 17-20, 1957, together with their charts, diagrams, graphs, tables and other illustrations, and with the verbatim discussion that followed their delivery, TECHNICAL PROCEEDINGS broadly enriches technical and scientific knowledge in the field of electroplating, metal finishing and allied arts.

Orders for copies will be accepted and serviced by the American Electroplaters' Society on strictly a first come, first served basis so long as its limited supply lasts.

The domestic cost of the book is $10 per copy including postage. To those ordering it from outside the United States' continental limits, the charge is $12 per copy including postage cost. All orders must be accompanied by payment in full so as to obviate unnecessary bookkeeping expense. Address orders to:

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A very limited quantity also exists of the 1956 Edition. Domestic price is $12.50 per copy; foreign $15 per copy. All orders must be accompanied by payment in full.

J. D. MacKenzie has been elected president of American Smelting and Refining Co. **R. W. Vaughan,** formerly president, has been elected vice chairman of the board.

Mr. MacKenzie, a resident of New York City, has come up through the ranks from a chemist and metallurgist at the company's Utah facilities, which he joined in 1920. During his 28 years with Asarco, he served as manager of several smelters and refineries in the United States and as a consultant to the Peruvian operations.

In 1948, Mr. MacKenzie was made vice president in charge of all smelting and refining operations and was elected a director the following year. He is also a director of General Cable Corp., Revere Copper and Brass Inc., Southern Peru Copper Corp. and Western Phosphates.

Mr. Vaughan, the new vice chairman of the board, joined Asarco in 1937 as assistant general counsel. He moved up to vice president and general counsel in 1947 and was elected a Director the following year. In 1957, he became President of the Company.

R. L. Jourdan has been elected vice president of Asarco. Mr. Jourdan, who lives in Ridgewood, New Jersey, has spent his entire business career with the company. He began in 1922 as a chemist and metallurgist and has been manager of the ore purchasing department since 1941.

E. J. Sears

J. D. MacKenzie

Edward J. Sears has become associated with the Apothecaries Hall Division of the Hubbard-Hall Chemical Co. as Massachusetts sales representative. Mr. Sears represented the electrochemical department of E. I. Du Pont de Nemours in this territory for many years.

This move will make possible expanded service to Apothecaries Hall customers in Massachusetts. Mr. Sears' home is in Belmont, Mass.

J. I. Munson of the Permutit Co., a division of Pfaudler Permutit, Inc., has been named North East regional manager with headquarters in New York. Other recent appointments include **D. C. Senges** as Central regional manager, headquarters, Philadelphia; **H. H. Morrison** as South East regional Manager, headquarters, Chattanooga; **W. H. Mitchell** as Mid-

West regional manager, headquarters, Chicago; **John S. Coppage** as section manager and **E. M. Partridge** as technical consultant of the chemical service section and **William Feik,** formerly assistant advertising manager, as market analyst.

Dr. Frank W. Hightower has been appointed head of the ultrasonic cleaning and processing division of Engineering Test Services, Inc., Tulsa, Oklahoma. He will be in charge of equipment sales, consulting and industrial application studies. Dr. Hightower was formerly with Branson Ultrasonic Corp., Stamford, Conn. Dr. Hightower is returning to his native Southwest after many years in the East and Midwest.

Ryan Sadwith has been named secretary and general manager of The Industrial Washing Machine Corp. of Matawan, N. J.

Mr. Sadwith formerly was vice president and director of manufacturing for the J. O. Ross Engineering Corp., also president of the John Waldron Corp. of New Brunswick, N. J.

R. Sadwith

E. Foote

Eric Foote, assistant to the president of The Diversey Corp., has been elected vice president in charge of Diversey's manufacturing operations in the United States. Mr. Foote, 33, is one of the youngest executives in the history of the Chicago company, world-wide manufacturers and distributor of chemical products and detergents for industrial use.

Mr. Foote has been with Diversey 11 years, following graduation from Northwestern University, where he earned a bachelor degree in chemical engineering. Starting as a development engineer in 1947, he was assigned to the testing of Diversey products throughout the midwest area.

In 1950, he opened a detergent plant for Diversey in South Gate, Calif., and became plant manager. Later, he started a similar plant in Port Credit, Ont., and a third in Newark, N. J. In January, 1952, Mr. Foote became assistant to the production manager, and in 1954, assistant to the president of the corporation.

I. William Marcovitch has been appointed general foreman in charge of painting, polishing and plating of the Sellersville, Pa., plant, American Machine and Metals, Inc. He was formerly plant chemist. Mr. Marcovitch is secretary of Philadelphia Branch, AES, and is active in national AES affairs, serving at present as a member of the Public Relations Committee.

Robert H. Probert has joined the Wyandotte Chemicals Corp. as a sales representative and will contact industrial and aircraft firms in Florida, from Tampa south. Mr. Probert was second vice president of Southeastern Branch, AES, and had been secretary for three years. He is a graduate of Georgia Institute of Technology, where he majored in industrial management. For five years, he had been with the Atlanta Plating Works, Atlanta, Ga.

DUE DATES FROM AES BRANCHES

OCTOBER 15 Return Sheets from accredited Delegates covering Branch Nominations for AES Scientific Achievement Award.

NOVEMBER 3 Return Sheets signed by both the Branch President and Branch Secretary designating and certifying the Branch's duly elected Delegates and Alternates for Credentials Committee accreditation. The tenure of these Delegates will be from the first Branch Meeting following the 1958 Cincinnati Convention to the first Branch Meeting following the 1959 Detroit Convention.

DECEMBER 1 (September if possible) Per Capita Taxes for all Branch Members in good standing covering the 15-month period from April 1, 1958 through June 30, 1959.

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WILLIAM H. EISENMAN

William Hunt Eisenman, 73, secretary and a founder-member of the American Society for Metals, died Friday, May 30 in a LaJolla, California hospital.

Mr. Eisenman, who served the ASM for 40 years and was managing director of the National Metal Exposition and Congress, succumbed following a heart attack at his Palm Springs, California vacation home.

A native of Jamestown, Ohio, Mr. Eisenman joined the American Society for Steel Treating, forerunner of the ASM, in 1918 as national secretary. Under his leadership the Society grew from a one-desk organization with fewer than 200 members to more than 30,000 members in 105 Chapters in the United States and Canada.

Mr. Eisenman was educated at Kenyon College, Stanford University, Morningside College, Iowa and Ohio State University. After a brief period as a professional football player with the old Olympic Club, he began his career as a high school principal in Olathe, Kansas, was head of the chemistry department at Racine (Wisc.) College, and superintendent of schools in Elmhurst, Illinois.

In addition to his long service as managing director of the National Metal Show, he directed the Western Metal Exposition and Congress biennially at Los Angeles, for 20 years, and shortly before his death had launched the new Southwestern Metal Exposition and Congress at Dallas, Texas.

His contacts were world-wide and he was originator and secretary general of the first World Metallurgical Congress at Detroit in 1951 and of the second Congress at Chicago in 1957. Both drew metals scientists from 40 countries.

Mr. Eisenman was honorary member of Die Deutsche Gesellschaft für Metalkunde (Germany), Societe Francaise de Metallurgie (France), Association des Ingenierures Sortis de l'Ecole de Liege (Belgium), and the Iron and Steel Institute (Great Britain). He was awarded the ASM's Gold Medal in 1956, for distinguished contribution to metallurgy.

During World War II he served as secretary of a special committee of 20 scientists working under auspices of the National Academy of Sciences on wartime metals problems and metals conservation.

During the past year, Mr. Eisenman donated to the American Society for Metals a 100-acre tract on his Russell Township farm, "Sunnimoor," in Geauga County east of Cleveland, Ohio. Construction is now underway there on the "ASM of Tomorrow," new $2,000,000 headquarters building for the Society.

At the time of his death, Mr. Eisenman was scheduled to receive an honorary Doctor of Laws degree from Western Reserve University, Cleveland, Ohio.

Surviving are his widow, Mildred Randle Eisenman, and a brother, Harley, of Richmond, Virginia. A son, Lt. William H., Jr., was killed in World War II. The family home is at 13300 Drexmore Rd., Shaker Heights, Ohio.

Services were held Friday, June 6, in Christ Episcopal Church, Cleveland, with burial in Knollwood Mausoleum.

Pallbearers were veteran members of the ASM staff. Some 35 officers and past presidents of ASM and civic and industrial leaders were honorary pallbearers.

CARL J. SOMMERS

Carl J. Sommers, president of Sommers Brothers Manufacturing Co., St. Louis, Mo., died in his 64th year, after a long illness, on May 5.

Mr. Sommers was affiliated with the plating and polishing industry for over 45 years, having started with Lasalco, Inc., of St. Louis, as a young man. After that he was associated with The Lustre Co. of St. Louis, and since April of 1941 was president of Sommers Brothers.

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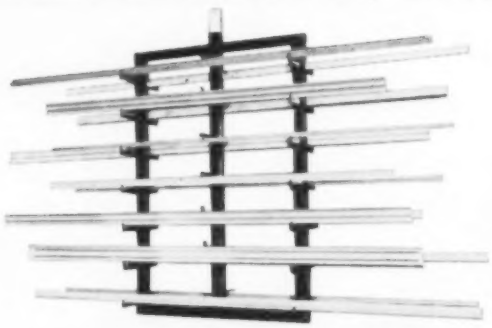

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BRANCH NEWS

Total AES Branches U. S., Canada Australia, July 1, 1958—58.

BRIDGEPORT

Bellinger Talks on Conversion Coatings

The regularly scheduled business meeting and educational session of the Bridgeport Branch was held in the main ballroom of the Hotel Barnum on Friday, May 9. President **Michael Tamas** called the meeting to order with 45 members and guests present.

Two applications for membership were reported and three new members were elected and presented with membership certificates and pins.

Floyd Tatum reported the New England Regional a financial success.

Henry Maskowski, general chairman of the Outing Committee appointed his committee: **Hubert Goldman, George Haas, George Eckholm,** Floyd Tatum, **Al Jocis, Bob Parker, Emil Bergen, Verg Consolvo** and **Al Ferguson.** The first Saturday in August had been selected but newer developments forced a change in plans. A report on these developments will be made at the June meeting.

Kenneth Bellinger, president of Conversion Chemicals of Rockville, Conn. was introduced by our librarian, **William Lindsay.** With the aid of some excellent slides Mr. Bellinger explained the progress through the years in the conversion of metal coatings. In addition to that he had many production samples of colored chemical coatings which provoked considerable interest. After a very interesting presentation a question and answer period followed and at its conclusion a rising vote of thanks was tendered Mr. Bellinger for his presentation.

The delegates to the National Convention were uninstructed.

Bill Lindsay reported on the recently held informal meeting of delegates at the North East Regional. It was an attempt to inform all delegates of what would be of interest at the National Convention.

Frank Kalafus will chairman the Christmas party.

George Wagstaff was selected as the chairman for Olde Timers Nite.

The Wethersfield Golf Party sponsored by the Hartford Branch was announced to the assembly.

Fred Lancaster won the door prize.

Bob Parker

BRITISH COLUMBIA

Lee Elected President; International Nickel Film Shown

The May 15 meeting was held at the N. F. B. Theatre.

Jim Lee asked for a suggested date for the C. P. A. tour of Bristol Britannia Airliner: June 23 was chosen. June 13 is to be the date of next meeting at which **Clarence Sample** of International Nickel will speak.

It was moved by **R. Wolloschuk,** seconded by **Nelson Shepperd,** that the elections be postponed for one month. The motion was defeated.

President **Bill Marquardt** called for nominations from the floor. After nominations closed, the following were elected: President, **Jim Lee;** 1st Vice President, **Gordon Smith;** 2nd Vice President, **Walter Kellerman;** Secretary, **Nelson Sheppard;** Treasurer, **Ralph Wolloschuk;** Director, **Ken Bain;** Director, **Claus Schlossareck;** Librarian, **Jim Hurford.**

A motion of thanks to the retiring executive board was made by Ralph Wolloschuk and seconded by Gordon Smith. Ralph Wolloschuk volunteered to investigate the possibility of Provincial Aid for the electroplating class.

The business meeting was followed by the extremely interesting film called "Milling and Smelting the Sudbury Ores" which showed the various smelting and flotation processes used to obtain nickel, copper, iron and precious metals at the International Nickel Co. plant at Sudbury, Ontario.

CAPITOL DISTRICT

New Officers Elected; Panel Discussion on Metal Finishing

The Capitol District Branch met on Monday evening, May 5 at the Hot Shoppes, Route 9, just north of Albany. A new membership application was received. In view of the poor response to the questionnaire for a June outing, it has been postponed until more interest is indicated by the members.

The next order of business was election of officers for 1958–1959. The newly elected officers are as follows: President, **John H. Green;** first vice president, **Robert Hill;** second vice president, **Zygamond Nash;** secretary, **William R. Allison;** treasurer, **Mike Guarneri;** librarian, **Ed Frieberg.** The Board of Managers for the coming year will be **Ray Dunlevy, Robert Wolf** and **Art Eisner.**

President **Wolf** announced that since there will be no June outing, there will be a June meeting at which time the newly elected officers will be installed. The president presided over a panel discussion during which various problems of metal finishing were brought up by the members. These problems and their solution were discussed with the panel consisting of **John Church,** technical service engineer for Udylite Corp., **Robert Hill,** director of research, Watervliet Arsenal, and in the absence, due to illness, of **Ted Infield,** Plating supervisor, General Electric Co., his assistant **John H. Green** sat in. Many and varied problems were discussed for approximately two hours to the satisfaction and interest of all present.

The next meeting will be held June 2, 1958, at the Hot Shoppes on Route 9 just north of Albany. **Rene Sonnenfeldt** of Sel-Rex Corp. is being contacted as a possible speaker for this meeting. His subject will cover, "Precious Metal Plating Abroad and at Home".

John H. Green
Recording Secretary

CHICAGO

Joint Meeting with Electrochemical Society; Studer on Satellite Plating

The monthly meeting of the Chicago Branch was held on Friday, May 2 at the Western Society of Engineers. It was held in conjunction with members of the Chicago Branch of the Electrochemical Society. A large attendance of members from the two branches were present.

The meeting was opened by **R. Scott Modjeska,** president, who welcomed the members of both societies and introduced the speaker of the evening. The speaker was **Richard R. Studer,** a native of Michigan, who received his metallurgical engineering degree at Michigan State. He is with Brooks and Perkins, where he is in charge of the analytical section for plating as well as the operations of the metallurgical laboratory.

His topic was "Plating the Magnesium Satellite." Mr. Studer illustrated his talk with the use of colored slides. The satellite material was an alloy of magnesium. The preparation of the magnesium prior to plating was very important. Highly buffing the spheres by the usual methods was not successful because of the blistering which later took place after plating. It was necessary to use (1) wet-sanding followed by (2) wet-buffing with silicon carbide to polish the spheres. The spheres were about 20 in. in diameter. After buffing, the spheres were cleaned, prior to zincating, by conventional methods as developed by Dow Chemical Co.

The spheres were then (1) zincated in

a diluted zincate bath at a temperature of 180F from 2–5 min.; (2) plated in a copper proprietary plating bath; (3) followed with a silver plate and lastly (4) plated with bright gold (Sel-Rex) from 40–50 millionths. The bright gold was then cleaned by gaseous discharge using 20–30,000 volts so that the final coatings could be applied.

The final coats were four layers of material applied by vapor deposition. The materials were applied in very thin layers, millionths of an inch, as follows: (1) chromium (2) silicon monoxide (3) aluminum (4) silicon monoxide (SiO). This combination of final coatings was best suited for reflectivity and infra red absorption.

A very lively question and answer period followed and Mr. Studer received a rising vote of thanks for his very informative talk.

Christopher Marzano
Publicity Chairman

CLEVELAND

Swalheim Presents Copper Plating; Outing in August

The Cleveland Branch held its regular monthly meeting in the Aviation Room, Hotel Carter, on May 2. One of the largest turnouts at a regular monthly meeting in many months occurred with 50 members attending.

The technical session was devoted to a talk on "Copper Plating" by **Dr. D. Swalheim,** director of Electro-Chemical Service Laboratory, DuPont Chemical Company. Dr. Swalheim's talk was very ably presented, and illustrated with numerous slides to show the effects of addition agents and different types of anodes. Questions and answers followed the very interesting talk.

A tentative date of August 2 was set for the annual outing.

Three new applicants for membership were introduced and elected. President **Bob Peters** conducted a short business meeting and after adjournment, refreshments were served.

Ralph Everstine
Assistant Librarian

COLUMBUS

Annual Banquet Held; New Officers Presented

The regular May meeting and annual banquet of the Columbus Branch was held at the Jai Lai Cafe on Thursday, May 1. Forty-seven members and wives attended.

President **Cal Smith** called the meeting to order and thanked the officers and members for their cooperation during the past year.

President Cal Smith introduced the speaker, **Bill Pepper** of WBNS-TV whose topic was "Bloopers on Radio and TV."

After a round of applause for the speaker, **Bill Neill** presented the newly elected officers for 1958–59. They are as follows: President, **Harry L. Moore;** 1st Vice President, **Marvin Pingel;** 2nd Vice President, **Rudolph A. Skriletz;** Secretary, **Halvor Christianson;** Treasurer, **Frank Gentile;** Librarian, **Leslie D. McGraw;** Board of Managers, **Nathan L. Koslin; William J. Neill; Calvin G. Smith.**

The newly installed President Harry Moore accepted the gavel from the outgoing president and adjourned the meeting.

Halvor S. Christianson

DAYTON

New Officers Elected; Weith and Waldron on Emulsion Finishes

The regular May meeting, a dinner meeting, was held at Pappy's Kitchen Klub on May 7 with 30 members and guests in attendance.

Three new members were elected; in addition we had one transfer-in.

The new officers for the coming year, elected at this meeting are: **Jack V. Baker,** president; **Bennie Cohen;** first vice president; **Byron A. Bowman;** second vice president; **Richard M. Clinchens,** secretary; **Richard H. Wright,** treasurer; **Lawrence J. Hadlock,** librarian; **Holle Luechauer, Robert Ruleff** and **John Easton** as the Board of Managers.

For his first act, the newly elected president, Jack Baker, on behalf of the members, presented Holle Luechauer with his Past Presidents Pin.

The speakers for the evening were **E. W. Weith** and **A. Waldron,** Paint Div., Glidden Co., Cleveland, Ohio. Their topic was "Emulsion Finishes—Their Application in the Metal Fabricating Industry". **Robert Brubaker,** their local representative was also in attendance.

R. M. Clinchens
Secretary

HARTFORD

McTague Talks on Plastic Coatings

The regular Branch meeting was held at the Hotel Bond on May 12, and 31 members and guests were present. Preceding the meeting a movie in color entitled "A Story of Research" was shown through the courtesy of the Du Pont Co.

The guest speaker for the evening was Robert McTague of the Stanley Chemical Co. whose subject was "Plastic Coatings for the Electroplating Industry".

MANUAL AVAILABLE TO BRANCHES

As a reference source to help Branches and Branch officers in effective Branch operation, many dedicated National and Branch leaders collaborated, without any remuneration, in preparing the comprehensive BRANCH OFFICERS MANUAL of the American Electroplaters' Society, embodying practically every conceivable Branch operating subject from membership promotion to Delegates' duties.

Within red covers bound by Chicago screws, this 225-page consolidated mimeographed looseleaf book is now in use in 36 AES Branches that ordered copies.

A limited extra quantity of the book is still available at National Headquarters for the accommodation of Branches that have not previously ordered copies. These will be sold to Branches (only), on a first-come, first-served basis so long as that supply lasts, at $5.50 per copy, including postage to one destination.

Write American Electroplaters' Society, Inc., American Building, 445 Broad Street, Newark 2, N. J. Payment should accompany order to obviate unnecessary bookkeeping expense.

Mr. McTague spoke mainly on the use of plastisols for rack coatings. Mr. McTague briefly reviewed the early use of rubber coatings for racks and some of their disadvantages. The use of the modern rack coatings composed of polyvinyl chloride with plasticizers have better abrasive resistance, can stand higher temperatures and are chemically inert. The use of the cold process of dipping the rack into primer, air drying and dipping into a plastisol followed by baking at 350F as compared to the hot process of dipping into a primer, heating to dry and while hot dipping into plastisol and baking was shown. Considerable research now going on to develop primers for better adherence. The use of vinyl coatings for stop-offs was lightly touched upon.

The technical chairman for the evening was **Edwin Crandall.**

Stanley Platoz
Secretary

INDIANAPOLIS

Swalheim Is Speaker; Contribute $100 to Research Fund

The Indianapolis Branch held its April 2 meeting at Fox's Steak House with 32 attending. After the usual introduction **Addison Howard** presented **Dr. D. A. Swalheim** of the DuPont Company.

Dr. Swalheim, with color slides, talked about the latest developments in Cyanide Copper Plating. Copper oxide has been determined to be the greatest single cause of roughness in copper plating, so it is also necessary to have copper anodes which are free of copper oxide. Chromium contaminations are best controlled by using chelating agents or Na SnO_2 in about 50 ppm strength. Ten seconds on-time with one second off-time is recommended for the DC interrupted current cycle. Many other items were explained in detail. Several questions were asked and answered very satisfactorily.

One application for membership was received and presented by **Bert Hawbee. Ed Bruck** made a motion that he be accepted by acclamation, which was seconded and carried.

The secretary, reporting on a Board of Managers meeting on March 24, presented on the blackboard the initial slate of candidates for office the following year. Also, **Bob Bruck** has consented to serve as Tri-State Custodian of Funds since **Edna Rohrabaugh** resigned due to new work and duties.

Les Reynolds, reporting on the Tri-State meeting of delegates, said that the Indianapolis Branch must elect a junior delegate by March 1959. He also requested help from suppliers, if necessary, to make a success in the '59 Tri-State meeting.

A request was made for questions which the committee can use to promote one of the educational sessions at the Cincinnati Convention.

John Hood made a motion that the Indianapolis Branch contribute $100 to the AES National Research Fund. This motion was seconded and carried.

The Indianapolis Branch is also proud to know that Les Reynolds was selected to serve on the AES National Membership Committee.

Two applications for membership were received.

Paul Freeman
Secretary

LOS ANGELES

Seyb Speaks on Chromium; 1960 Convention Committee Active

The meeting on April 9 was called to order at 8:35 by President **George Magurean.** Eleven guests were introduced by the sergeant-at-arms, **Milton Weiner.** The membership report by the first vice president, **Norman McEwan,** indicated 7 prospective new members. One new member was inducted.

The results of the membership contest were First Place; **John Manning,** Second Place; **Dave Seymore.**

George Hetz, co-chairman of the 1960 National Convention reported that two meetings had been held since the last Branch meeting; 18 out of 20 members were present.

Ed Wells in his report from the Board of Managers told of a successful year both financially and in membership. Congratulations were offered to the officers for a job well done.

Announcement was made of President **Francis T. Eddy's** visit to the Los Angeles branch on Wednesday, April 23.

The meeting was turned over to **Earl Coffin** for discharge of old officers and induction of new officers.

The officers inducted were: President, **Norman K. McEwan;** 1st vice president,

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George J. Hetz; second vice president, **Frank Virgil**; treasurer, **Emmett H. Babcock**; secretary, **Don W. Baudrand**; sargent-at-arms, **Wm. C. Heinecke**; Research Chairman, **Barrie Blackburn**; Handbook chairman, **Dave Seymore**; General Annual Chairman, **Larry Henderson.**

Dr. Seyb of Metal and Thermit was introduced as the speaker of the evening. Dr. Seyb is research supervisor for United Chromium division of Metal and Thermit Corp. He spoke on "Bright Crack-Free Chromium."

D. W. Baudrand
Secretary

MELBOURNE

McAfee Talks on Metals; Littauer to Convention

The regular meeting of the Melbourne Branch was held in the Metallurgy Theatre, Royal Melbourne Technical College on April 17.

After showing of films, President **John Christian** opened the Technical Session and called on the immediate past president, **Kevin Howard,** to introduce the guest speaker. In introducing **J. McAfee,** Mr. Howard mentioned that our guest would be no stranger to many of our members, as he is Senior Lecturer in Metallurgy at the Royal Melbourne Technical College.

Mr. McAfee addressed the gathering on "What is a Metal". Mr. McAfee described the crystalline structure of metals and how this is affected by alloying. He continued by detailing how the properties of metals can be improved by mechanical working, heat treatment, age hardening, etc. Particular mention was made of failure by fatigue which can be initiated by electroplating. Mr. McAfee succeeded in presenting a complex subject in a manner readily understood by all, proof was the lively question period which followed.

After a vote of thanks by **John Dale,** the president announced that one of our past presidents, **Herbert Littauer,** would be representing our Branch at the forthcoming Convention in Cincinnati. Mr. Littauer was also congratulated in having been nominated a member of Rotary. Being one of the real outposts of the AES, we are particularly pleased that Mr. Littauer is able to represent out Branch in Cincinnati. He takes with him the best wishes of all our members to our fellow electroplaters in the U. S. A.

Ian W. Rose
Honorary Secretary

MIAMI

Officers Returned for Second Term

The April 30 meeting of the Miami Branch was held at Jerry's Restaurant. A fine dinner was enjoyed by all present.

Following dinner the meeting was called to order by the president, **Duke Dent.** The first order of business was the election of officers for the coming year. Duke asked **Tom Rogers,** Hanson-Van Winkle-Munning, who was visiting the area if he would be kind enough to take the chair and handle the elections. Mr. Rogers agreed.

C. Posner suggested that a year was not enough time for a group of officers to accomplish too much in the case of our Branch due to the fact that we are such a young Branch. He further suggested that since such was the case, we re-elect the same officers for another year. Following discussion by several members, Tom Rogers stated that he knew of precedents that had been set in other Branches and was sure that it was quite legal.

A motion was made and seconded that the same officers be retained for another year. The motion was put to a vote and carried unanimously.

The officers are as follows: President, **M. H. Dent;** first vice president, **E. Owens;** second vice president, **J. Gibbs;** secretary-treasurer, **A. F. Newlander;** librarian, **R. Wharton.**

At the conclusion of the elections a representative of the Behr-Manning Co., showed a very informative film, which covered methods of grinding, polishing, and etc.

Duke Dent is attending the National Convention in Cincinnati. An interesting sidelight in this regard is the fact that he will be accompanied at the meetings by **C. A. Piedrahita,** who is with Avianca in Barranquilla, Colombia, S. A. Mr. Piedrahita is a chemical engineer and was graduated from Universidad Pontificia Bolivariana, Medellin, Colombia.

It is our fond hope that Mr. Piedrahita will leave the convention a full fledged member of the society.

A. F. Newlander
Secretary

MILWAUKEE

Metal Finishing Forum; Membership Polled for Meeting Topics

The 489th regular meeting of the Milwaukee Branch was held May 9, at the Maryland Hotel, with **E. H. McCoy** presiding.

Herman Tessman, the chairman of the Meeting Place Committee, announced that the Branch would again meet at the Ambassador Hotel for its regular scheduled meetings, commencing with the October 1958 meeting.

Les Diveley called attention to the fact that the Branches Bylaws do not provide for the election of an organic librarian and that the Branch could not vote for one at this time. Mr. Diveley recommended that the organic librarian be removed from the ballot and be appointed an assistant librarian and that he be made an ex-officio member of the Board of Managers.

The following members were elected to office in the Milwaukee Branch for the year 1958–59: President, **Frank Marshall;** 1st vice president, **S. Taterzynski;** 2nd vice president, **L. Warnecke;** librarian, **Walter Higgs;** secretary-treasurer, **F. Padgett;** Board of Managers, **K. Olsen;** Delegates, **L. Diveley-P. Ritzenthaler-F. Marshall.**

Ted Sobczynski was appointed assistant librarian in charge of organizing the 1958–59 educational program for the Organic Section. Les Diveley reported on the Midwest Regional meeting. Mr. Diveley informed the membership on the aspects, implications and advantages of a Regional Council. The proposed Regional Bylaws were read and tacitly approved by the membership.

A thorough discussion was held concerning the bid for the 1962 National Convention in Milwaukee. **Gene Piellusch** moved that the Delegates be instructed to make a bid for a National Convention, if available, in 1962 and contingent to the wishes of the Regional Council. The motion was seconded and passed by the membership.

Ted Sobczynski distributed a list of suggested topics for organizing the organic and inorganic educational program for 1958–59. The membership was requested to check off and/or insert on this list items of interest. This data would then serve as a guide to the program chairman so that he could strive to arrange a program of specific interest to the membership.

The chair was passed to Gene Piellusch, the librarian, who conducted an Open Forum discussion on Metal Finishing Problems.

S. Taterzynski
Secretary-Treasurer

MONTREAL

Gore Presents Tin Alloy Plating; Banquet Date Announced

The regular monthly meeting of the Montreal Branch was held in the Mount Royal Hotel on May 5. The meeting was called to order by President **John Serbeniuk. J. Saimoto** introduced **Bob Gore** of Metal and Thermit Corp. who gave a very interesting and educational talk on Tin Alloy Plating. The speaker was thanked on behalf of the branch by **W. T. Scott.**

J. T. Reisenburg Jr. reported that he had secured the Salon Dore at the Queen's Hotel for our annual dinner/dance to be held on the evening of October 4, 1958. Mr. Serbeniuck reported that he would have a committee appointed for the dinner/dance at the next meeting. A new member was welcomed on behalf of the branch by **J. T. Reisenburg Sr.**

R. W. Niggemann
Secretary-Treasurer

NEWARK
Ladies Night;
Electroplating Course Completed

Ladies' Night was held on April 11 with some 90 people in attendance. A number of ladies joined in dinner at the Robert Treat dining room prior to the meeting. After the movies presentation, a brief business meeting was held. Four applications were accepted and one applicant was elected to membership. The graduates of the Newark Electroplating Course were awarded their diplomas.

Lou Donroe then introduced the "Masquers of Irvington", a little theatre group, with great talent. Two short acts were presented and were enthusiastically received.

Drawing for door prizes for the ladies then created a new interest. There were so many and the ladies so lovely that your reporter lost track of everything that happened—but it was fun.

To wind up the affair, refreshments were served amidst a great deal of chatter ending a very pleasant evening.

D. Gardner Foulke
Secretary

NEWARK
Organic Group Being Formed;
Foulke '63 Convention Chairman;
Sonnenfeldt and Saubestre Speakers

Following the showing of several films by **Howard Cobb**, President **Grigat** called the May 16 meeting to order with seventy-five in attendance.

Four applications were accepted for review by the Board of Managers and four new members were elected.

Tom Austin reported progress in the formation of an Organic Finishing Group. **John Banta** spoke for the Membership Committee urging support of the Organic Finishing program and said each member would receive a membership blank with his September Sparks to help bring in new members. **Al Korbelak** reported the 1958–59 program plans well along and that speakers were being contacted.

Gus Bittrich introduced **Milt Nadel**, Secretary, and **Ed Saubestre**, President, of the New York Branch and **Rene Sonnenfeldt** of Syracuse Branch.

Don Foulke was elected chairman of the Convention Committee to lay plans and promote a convention "Down by the Sea in '63". He reported the groundwork done. The hotels have been selected, Ambassador and Ritz-Carlton, and the date set, week of June 23. Pins have been purchased for distribution and a banner "Down by the Sea in '63" was unveiled by Al Korbelak. Don asked that all the Newark members at the Convention assist in passing out pins, saltwater taffy and manning the Newark Room.

The business meeting closed on a sad note with all the members standing for a minute of silence in tribute to **Louis Donroe** who passed away suddenly on Monday. Lou, who had served in almost every office of the Branch, and was President in 1945, will be missed by all members of Newark Branch and many members of other Branches.

Al Korbelak then introduced **Rene Sonnenfeldt** of Sel-Rex who presented the Timely Topic "Plating in Europe". He noted the far-reaching influence of Langbein-Pfanhauser, Werke and Canning in Europe practice and the emphasis on selling packaged salts. He mentioned Schlotter's contribution on bright nickel and Switzerland's in anodizing. He noted that European platers still tended towards secrecy on all levels but noted that courses in plating had reached a level beyond those in the U. S., a four year course in plating in Germany (state controlled) was cited as an example of the attention given.

Dr. Ed Saubestre of Sylvania Electric Products discussed "Nickel Electroplating" taking the salts present in the bath and explaining how they fit into the electroplating process. He pointed out that the nickel ion concentration (activity) from the nickel sulfate was actually relatively small and in this sense was not as different from the (Cu^{++}) in cyanide copper baths as one might think. He noted the role played by activation over voltage.

He then compared the activity of nickel

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from nickel chloride with that from sulfate and described the use of an ion-exchange resin diaphragm between a Watts' (anolyte) and a nickel sulfate (catholyte) electrolyte.

The function of boric acid was discussed and he noted that boric acid can polymerize to tetraborate and as such dissociate and said that at least 4 oz/gal is necessary. He noted that the metaborate also present can form a ring structure and as such act as a chelating agent.

Anti-pit agents, particularly hydrogen peroxide, were discussed in conclusion.

The extended question-and-answer period at the conclusion of the formal presentations attested to the interest in the talks of the two speakers.

D. Gardner Foulke
Secretary

NEW HAVEN
Gore Presents Paper; Meeting Place Changed

Following dinner at George and Harry's, the May meeting of the New Haven Branch was held at Mason Laboratory of Yale University on Tuesday, May 13. President **Charles A. Kuster** presided at the business session. Following a report by **William K. Murray**, the membership voted to change the regular meeting place to the newly constructed New Haven Motor Inn where excellent accomodations were secured.

Technical Chairman **Harry R. Taylor** introduced the speaker for the evening **Robert Gore** of the Metal and Thermit Corp. whose topic "Tin and Tin Alloy Plating" was interestingly presented. Mr. Gore's talk was highlighted by many vivid projection slides. The interest this topic aroused was evident in the lively discussion period which followed the talk.

The meeting closed with a reminder not to miss the June Social which will be held on Friday, June 20.

William E. Bridgett
Historian

PHILADELPHIA
Saltonstall on Agitation in Electroplating; New Officers Installed

The final regular meeting of the Philadelphia Branch was held at the Engineers Club on May 26, with 36 at dinner and about 50 at the meeting. Among the five guests were **J. Wright** and **K. Sargeant** of the British-American Banknote Co., Ottowa, Canada. **Mr. Cogan** announced that tickets for Ladies Night, June 20, must be paid for one week before that date.

One active member was admitted and one application received. The Branch delegates and alternates who attended the Cincinnati convention each gave a brief report on the business and technical aspects of the convention. The officers elected for the 1958–59 term were installed by Past Branch President **Ottens.**

The speaker was **Dr. Richard B. Saltonstall,** The Udylite Corp., who spoke on "The Role of Agitation in Electroplating." He described various methods of solution agitation: by rod, pump, power mixer, air (only recently introduced in this country for plating solutions), ultrasonic. As reasons for agitation, Dr. Saltonstall gave: temperature and stratification concentrations and the sweeping action either at the work or the electrodes. Described in detail were the methods of agitation and the reasons for each method in the following solutions: cleaners, rinses, electropolishing (although too much might be harmful since the process depends basically on the polarization effect), pickling, stripping, plating including purification, chemical treating, chemical additions. As the principal disadvantage of excessive agitation, Dr. Saltonstall cited the adverse effect on plate distribution, especially in alkaline solutions, where the polarization effect at the cathode promotes uniform plate distribution. To overcome decreases

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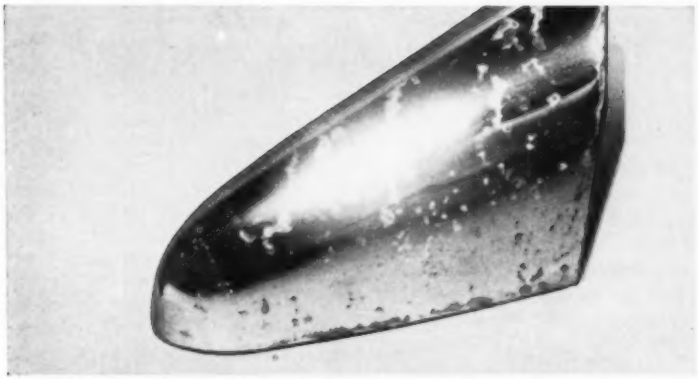

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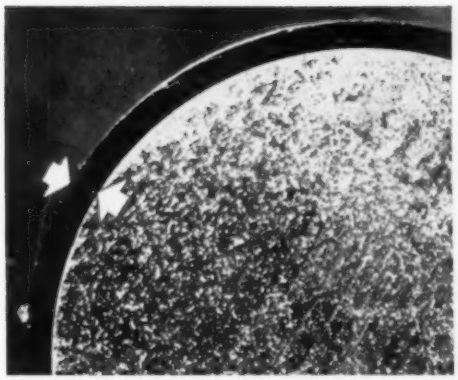

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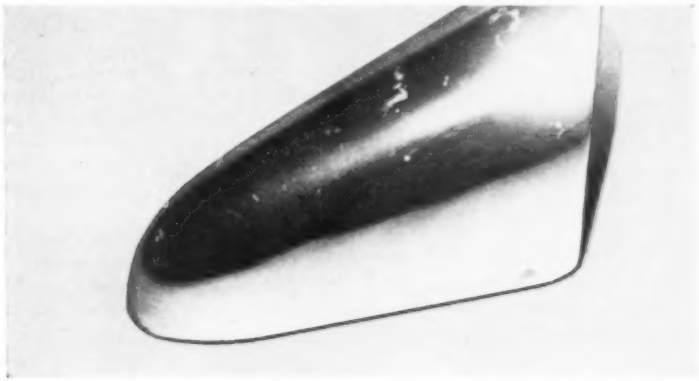

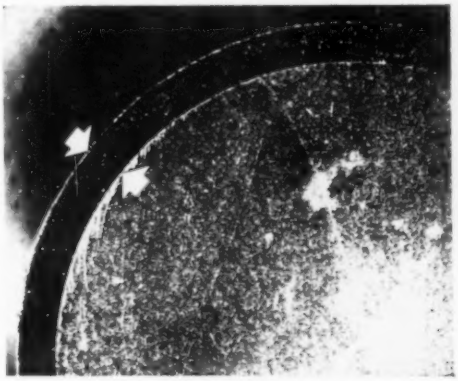

How to get more corrosion resistance from chromium plate

When consumers find fault with decorative chromium plate, it's generally due to early corrosion.

This trouble starts with pores and cracks that occur in all ordinary chromium in the range of thicknesses generally used for decorative plating. Road chemicals, salt atmosphere and fumes find a path right down to base metal. Corrosion starts. As corrosion increases, finish failure progresses, allowing still more corrosion.

But you can stop this at the source.

THICKER, CRACK-FREE CHROMIUM

Chromium itself is passive. It doesn't corrode. Eliminate pores and overcome its cracking and you greatly improve its corrosion *protection*. Pores are eliminated by thicker plating. To overcome cracking, use the Unichrome Bright *Crack-Free* Chromium Process. This deposit is free from corrosion-admitting cracks. It has already been used in automotive production for a year.

MINIMIZE YOUR PRODUCTION PROBLEMS

Unichrome *Crack-Free* Chromium is far superior to ordinary chromium not only in protection, but also in operating advantages. The solution is self-regulating. It offers improved throwing power, also better coverage – even over passive nickel.

TO PLATE THICKER CHROMIUM

For those who desire thicker deposits but do not require freedom from cracking, other Unichrome self-regulating processes offer distinct advantages. They plate up to 80% faster than ordinary chromium plating processes. They cover parts with less dulling or burning, are less susceptible to clouding due to current interruption. Control is simplified by their self-regulating features.

Whichever process is best for your operations, Metal & Thermit has over 30 years of service experience to help you make it work. Call in an M&T plating engineer to survey your requirements, tell you what's needed for the results you want. Or, send for Bulletins.

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polarization, the cathode current density must be proportionately increased. Excess agitation also tends to bring addition agents to the cathode at a higher rate, thus producing lower concentrations of the addition agent at the higher current density areas.

Dr. Saltonstall spoke on the use of air agitation in nickel solutions—a recent development. A low pressure blower must be used to prevent oil contamination. A film was shown which observed air agitation in a clear sided test tank containing water. The effect was observed of various guards for anodes (nylon net, coated rods, weight in bottom of anode bag) to keep the bags from catching in the work when moved by the streams of air. Dr. Saltonstall claimed that with solution filtration of from once to twice an hour, air agitation gives the smoothest deposits of all agitation methods.

Following an extensive question period, Dr. Saltonstall was given a rising vote of thanks for his very interesting and well presented paper. We recommend his presentation of this talk to other Branches.

I. Wm. Marcovitch
Secretary

ROCKFORD
McCoy and Fairhurst are Speakers; June Picnic

The May meeting of the Rockford Branch was held Monday evening, the 12th, at the Faust Hotel.

Twenty-seven were present for dinner, and several more were in attendance for the business meeting and talks which followed: President **Stuart Golding** opened the meeting.

Walter Fox reported that his Committee had conducted a survey and found it advisable to have a picnic in June. This affair to be held June 9 at the Policeman Pistol Range. A Committee composed of **Marvin Olsgaard, Bill Gritzmacker, Leonard Weeg** and **Harold Gustafson** were appointed to handle this social gathering.

A date was set for the Annual Educational Session and Banquet to be held March 7, 1959, at the Faust Hotel.

Carroll Pickering, Harold Gustafson and **LeRoy Johnson** were appointed to handle the Annual Plae-Dae for 1958.

Murray Rounds introduced **E. H. McCoy** of Electro Chemicals Products Co. of Milwaukee, Wis., and **George Fairhurst** of Rockford Varnish Co., Rockford, Illinois, who presented two very fine talks which were very well received.

A lively discussion period followed!!!

E. J. Budden
Secretary-Treasure

ST. LOUIS
To Form Organic Coating Division

The regular monthly meeting of the St. Louis Branch was held at the York Hotel, Wednesday night, March 12 with 21 persons for dinner. There were 36 members and guests present when the business meeting was called to order by President **Craig MacAlister.** A discussion was held relative to forming an Organic Coatings Division. It was pointed out that the Milwaukee branch had doubled their membership since forming the organic division. We will try to start next year.

It was decided that our delegates would support Kansas City's bid for the Interim meeting next January. Our next meeting will be Past Presidents Night. A motion was made by **Gerry Clooney,** seconded by **Louis Berra,** that we order 18 silver pins from national headquarters to present to each past president.

A discussion was held relative to our Branch joining a Regional. Some members were in favor of joining in with the Midwest others favored joining in with the Southwest. The chairman said we would explore both possibilities and make a decision at a later date.

Dale Bolyard reported for the nominating Committee and its choice of officers were elected: President, **Bill George;** first vice president, **William Piel;** second

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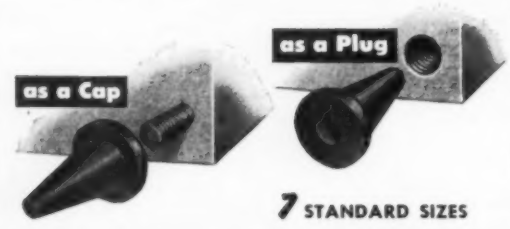

7 STANDARD SIZES

	A	B	C	D	E	F	G
TO PLUG HOLE SIZE	1/8-3/16	3/16-1/4	1/4-5/16	5/16-1/2	1/2-5/8	9/16-11/16	5/8-3/4
TO CAP STUD SIZE	3/32-5/32	5/32-3/16	3/16-1/4	1/4-5/16	5/16-3/8	3/8-7/16	5/16-1/2

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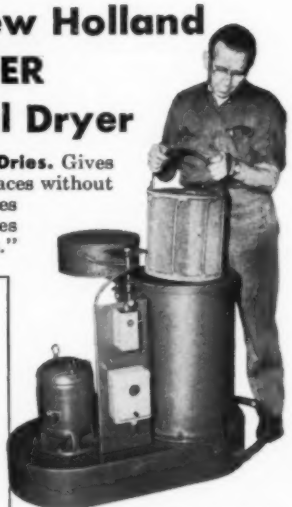

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ST. LOUIS INSTALLATION OF OFFICERS AND PLATING SCHOOL GRADUATION

Left: Ed Musick, past National President, 1926, and now honorary member (profile at extreme left); William Piel, first vice president; Bob DeGuire, second vice president; Lou Berra, treasurer; Ward Kelly, secretary; Arthur Wrisberg, librarian; Craig McAllister, past president and member of Board of Managers; John Moran, Board of Managers. Absent from the picture: William George, president, and L. A. Davies, Board of Managers. Right: Graduates of St. Louis plating school. Standing, left to right: Lou Berra, Gerry Clooney, Mitchell Duncan, Donald Koehler, Arnold Koehler, Warren Leonard, Arthur Miller and William Piel.

vice president, **Robert DeGuire**; treasurer, **Louis Berra**; secretary, **Ward Kelly**; librarian, **Arthur Wrisberg**; Sergeant-at-Arms, **Homer Thomen**; Board of Managers, **L. A. Davies, John Moran, Craig McAlister.**

At this point the meeting was turned over to our Librarian **Ruel Shumway** who introduced **William Pierce**, of Harshaw Chemical Company who made a very interesting talk on "Duplex Nickel Plating".

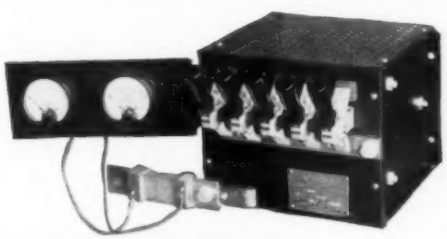
Ward Kelly
Secretary

ST. LOUIS
Will Join Midwest Regional; Past Presidents Honored

The regular monthly meeting of the St. Louis Branch was held Wednesday night, May 14, with 31 people for dinner. There were 35 members and guests present when the meeting was called to order by President **Craig McAlister.** Three new members were accepted into the Branch.

Andy Julius reported the Board of Managers had decided to recommend to the Branch that the St. Louis Branch should affiliate with the Midwest Regional. **Ken Robins** made a motion to this effect, seconded by **Marvin Goldstein.** After a lengthy discussion the motion carried. **Otto Klein,** instructor of our Plating School assisted in the presentation of diplomas to the following students who completed this year's course: **Louis Berra, Gerry Clooney, Mitchell Duncan, William George, Don Koehler, Arnold Koehler, Warren Leonard, Arthur Miller, William Piel** and **Howard Rice.** Our chairman congratulated the group and instructor Klein for excellent work. Dr. Klein thanked the Educational Committee and particularly the chairman, **Ed Sertl,** for the effort exerted in organizing the school. Louis Berra reported the educational committee has decided to start another beginners class this fall. They would like to have 30 enrolled. Dr. Klein again will be the instructor.

Ed Musick, past National President and now Honorary Member, was called upon to install the officers for the coming year.



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There was no speaker scheduled for the evening since the meeting was to honor the past presidents. Only 11 past presidents were present. Ed Musick was a charter member of the St. Louis Branch and, therefore, knows the history of the Branch from its beginning. He was president when the Branch was organized in 1913. He brought with him a picture of the first AES national banquet. He could identify 73 persons at the table.

Al Barth, 1937 president, was present. **Frank Horath Jr.,** 1941 president, in a few brief remarks told us his dad had been president in 1931, and he had attended a few meetings with him. He noted a significant change from former days when an electroplater would keep secret his methods and formulas. Now the society promotes the exchange of ideas.

Frank Menniges, 1943 president, recalled Ed Musick had installed him as president—but it took longer at that time. **John Moran,** 1944 president, thanked Craig McAlister for creating interest in the Branch and congratulated him for a wonderful job.

Kenneth Robins, 1945 president, mentioned that his dad had applied for membership in 1915. **John Vogt,** 1946 president, commented that it was a pleasure to be a member and to see the old members present at this meeting. **Fred Stark,** 1947 president, said he had had many experiences but didn't think anyone would want to hear them. Andy Julius, 1952 president, said there had been too much said already. He appreciated the help he had received from the society. He had been a member about 17 years. **Dale Bolyard,** 1953 president, said he felt much the same as Andy Julius. His membership dated back to 1926. Louis Berra, 1954 president, said the group was wonderful, he enjoys every year. Craig McAlister, retiring president, said he was happy to join the past presidents group.

Each past president was presented with a silver past presidents pin. The group gave Craig McAlister a standing vote of thanks for the wonderful job he had done in recognizing the past presidents.

Ward Kelly
Secretary

SAN FRANCISCO
Hear Talk on Psychology

The regularly scheduled meeting of the San Francisco Branch was held at the International Inn on May 8. Fifteen members and two guests were present.

Guy Condrott introduced the speaker, **Dick Taber,** who spoke on "How to Understand What People Say and Do." This was a very interesting talk which brought up the psychological aspect of management in the plating industry.

The membership Committee headed by Mr. Condrott reported three applicants for membership.

Trevor Harry, librarian, stated that speakers were available for the summer months if the Branch decided to hold meetings during these months.

A discussion on the collection of delinquent dues brought forth a motion by **Fred Dartt** that all members be notified if delinquent in their dues, suspension would follow if payment was not made by June 30. The motion was passed unanimously.

President **Jack Hite** brought up for discussion the subject of holding our meetings so that members could have their dinner at home or elsewhere and then attend the meeting during the lecture and business session. It was thought that some members might attend more often if their expenses were cut down by eliminating the cost of dinner. No decision was reached on this subject.

R. T. Coen
Secretary-Treasurer

SYRACUSE
Sonnenfeldt Talks of European Electroplating

The regular monthly meeting was held at Turn Hall on April 21. Officers for the new year were installed. The date for the Annual Clambake was announced as June 21.. One new member was elected.

Rene Sonnenfeldt of Sel-Rex spoke on "Electroplating Practices in Europe." This interesting talk was followed by a lengthy question and answer period.

Robert Carpenter
Recording Secretary

TORONTO
Rack Manufacture Discussed by Hitter and Faulman

The "Gone Fishing" sign was hung on the door Friday, May 9 (See you all in September). Thirty members were present for dinner, the Past Presidents were guests of the Branch. **Colin Turner, Jim Vaughan** and **Ben Cameron** were on deck.

Professor **Bert Gerrans,** Honorary Member is confined to Western Hospital and we wish him a speedy recovery. The dapper **Cy Short** was missed and we hope the "Ladies in White" will release him real soon, Wellesley Hospital is the address.

Four visitors were welcomed and three applications were accepted. Ben Cameron presented **Mel Green** with the Past Presidents Pin, congratulations for an excellent job on the gavel.

Messrs. Hitter and **Faulman,** of Imperial Plating Rack Co., London Ontario spoke on "Rack Manufacture". Mickey Faulman answered all questions. The meeting adjourned at 9:15, refreshments were served.

A. W. Wilson
Librarian

TWIN CITY
Linn is Speaker; Election Held

The Twin City Branch held its regular monthly business and technical meeting at Jax Cafe in Minneapolis, Minn., on May 5. Thirty-seven per cent of the membership and four guests were present.

An election of officers was held at the May meeting and the following men were elected for the 1958–1959 business year: President, **Cort Platt**; first vice president, **John M. Zangs Jr.**; second vice president, **Carl Ahlgren**; secretary-treasurer, **Robert L. Buckley**; librarian, **Donald Drogue**.

Our technical speaker for the evening was **Arthur M. Linn** of Metal and Thermit Corp. Mr. Linn delivered an extremely interesting lecture on the subject of "Rack Coatings and Stop-Offs". His thorough knowledge of the subject, command of words, and manner of delivery made the technical session very informative. After a question and answer period, the group displayed their appreciation and the meeting was then adjourned.

WATERBURY
Old Timers Night With Old Timers Panel

The May meeting of the Waterbury Branch was held at the Roger Smith Hotel on May 8. The secretary enumerated several changes in operating procedure which are to be tried in the next year in an effort to get greater participation in the business affairs of the Branch.

The title of the evenings activities was "Old Timers Night" and there was a large turn out of old timers. Secretary **Al Griffith** read a list of twenty members who have been in the branch twenty or more years and a list of past presidents, many of whom were at the meeting. An "Old Timers" panel composed of **Leroy Miller, Clifford Prescott** and **Bert Sage** did justice to the topic, "Plating, Yesterday and Today". It was of particular interest to we newcomers to the trade to learn of the early trials and tribulations in the development of processes which we now take for granted. Early development of cleaning, brass plating, cadmium plating and chrome plating was discussed.

Following the meeting beer, potato chips and much conviviality were dispensed as the group stayed to reminisce.

The next meeting will be held in September.

F. A. Schneiders
Publicity Director

AES MEMBERSHIP REPORT

ELECTIONS

British Columbia: G. H. Caslor

Cleveland: A. M. Dauber, A. P. Gruler, T. E. Hack, W. J. McDonnell, P. Ondrus

Dayton: W. W. Anderson, J. K. Burkard, J. G. Newman

Detroit: S. J. Dymkowski, R. J. Radomski, D. H. Snelgrove

Grand Rapids: K. L. Smith, C. A. Vandersloot

Kansas City: J. L. Grady

Lancaster: A. H. Ream, C. W. Walter

Los Angeles: A. J. Niedzwiecke

Montreal: L. Dicaire

Newark: A. Garp, J. Myron, C. Shutt, E. H. Welsh

Philadelphia: T. J. Grindler, III

Saginaw Valley: N. Kanous

Seattle-Puget Sound: D. H. Tuel

Member-at-Large: H. R. Johnson, Livermore, California; A. Leites, Mexico, D. F., Mexico; G. H. Wood, Attleboro, Massachusetts

REINSTATEMENTS

Cleveland: E. C. Bright

Grand Rapids: J. Lindsey

Hartford: J. M. St. Pierre

Newark: G. C. Arnold

TRANSFERS

Cleveland: E. C. Bright to St. Louis, G. DeCario from Detroit

Dayton: A. L. Schmidt from Indianapolis

Kansas City: W. S. McCormick from Pittsburgh

Los Angeles: H. R. Smallman to San Francisco

RESIGNATIONS

British Columbia: G. D. Lissner

Cincinnati: R. P. Glorius

Detroit: H. J. Breithart, R. J. Kuretich, J. S. MacNairn, A. R. Sanborn

Melbourne: J. Bardsley, F. W. Harbour, A. S. Ross

Montreal: B. J. Lafond, B. D. Russel, L. Sylvia

Newark: F. Koble, C. B. F. Young

Saginaw Valley: G. T. Larsen

Southeastern: F. Fletcher

Member-at-Large: G. Gabrielson, Goteborg, Sweden

SUSPENSIONS

Hartford: J. R. St. Pierre

Milwaukee: D. R. Logan

Rockford: C. Carlson

Saginaw Valley: C. L. Shultz, J. M. Small

Syracuse: C. Garrard, M. Lawlor

DEATHS

Montreal: L. Daigneault

Newark: J. Cirello

Member-at-Large: G. K. Burton, London, England

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BRANCH DIRECTORY CHANGES

BRITISH COLUMBIA
Secretary: Nelson Sheppard
No. 4, 2720 Lonsdale Ave.
North Vancouver, B. C.
Meeting Place: White Spot Barbecue, 25th & Cambie Sts., Vancouver, B. C.
Day of Month: Mid-Month
Time: 6:00 p. m.

BUFFALO
Secretary: Robert Leinert
44 Fenser Street
Kenmore, New York
Meeting Place: Niagara Manor, 899 Niagara Falls Blvd. Buffalo, N. Y.
Day of Month: 1st Friday
Time: Dinner 6:30 p. m. Meeting 8:00 p. m.

CENTRAL MICHIGAN
Secretary-Treasurer: R. W. Boos
2400 East Mt. Hope
Okemus, Michigan

CLEVELAND
Secretary-Treasurer: James K. Long
1945 E. 97th Street
Cleveland 6, Ohio

GRAND RAPIDS
Meeting Place: Scottie's Restaurant—"Trader Room"
Time: 7:00 p. m.

LANCASTER
Secretary-Treasurer: I. Paul Sharrets
704 Barbara St.
New Cumberland, Pennsylvania

LOS ANGELES
Secretary: Don Baudrand
791 E. 15th St.
Los Angeles 21, California

MELBOURNE
Secretary: I. W. Rose
41 Glen Orme Avenue, Ormaon S. E. 14
Melbourne, Australia
Time: 7:30 p. m.

MILWAUKEE
Secretary-Treasurer: Frederick F. Padgett
4510 N. 22nd Street
Milwaukee 9, Wisconsin
Time: Meeting 8:00 p. m.

MONTREAL
Secretary-Treasurer: R. W. Niggerman
4448 Beaconsfield Avenue
Montreal 28, Canada

PITTSBURGH
Secretary: Edward B. Keller
1102 Sunday St.
Pittsburgh 12, Pennsylvania
Meeting Place: Gateway Plaza, Pittsburgh 35, Pennsylvania
Day of Month: Second Wednesday
Time: Dinner 6:30 p. m. Meeting 8:00 p. m.

PORTLAND
Secretary-Treasurer: George Bethell, L. H. Butcher Company
2750 N. W. 31st
Portland, Oregon
Meeting Place: Old Country Kitchen
Day of Month: Speaker's Convenience
Time: 6:30 p. m.

ST. JOSEPH VALLEY
Secretary: Henry A. Meers
2001 Bergan St.
South Bend, Indiana
Meeting Place: Lincoln Highway Inn, Mishawaka, Indiana
Day of Month: First Wednesday
Time: 7:00 p. m.

SAN ANTONIO
Secretary-Treasurer: Mrs. Katherine D. Christians
106 Pool Dr.
San Antonio 10, Texas
Meeting Place: Terry Industries, Inc.
2805 S. Flores St. San Antonio, Texas
Day of Month: Third Monday
Time: 7:30 p. m.

SOUTHEASTERN
Meeting Place: Belmont Steak House, Downtown Luckie Street, Atlanta, Georgia
Day of Month: 2nd Friday
Time: 7:30 p. m.

SPRINGFIELD
Day of Month: Fourth Monday, Sept. to May, except December

SYRACUSE
Secretary: Robert A. Carpenter
138 Oakland Street
Syracuse, New York
Time. Dinner 6:45 p. m. Meeting 8:00 p. m.

TOLEDO
Day of Month: 1st Thursday
Time: Dinner 7:00 p. m. Meeting 8:00 p. m.

WATERBURY
Time: Dinner 6:30, Meeting 8:00 p. m.

WESTERN ONTARIO
Secretary-Treasurer: Robert Dobson
Box 41, Watford
Ontario, Canada
Time: 6:30 Dinner Meeting

WICHITA
Meeting Place: Oriental Cafe, 5404 East Central, Wichita, Kansas
Time: 6:30 p m.

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SITUATION WANTED—Plating Chemist or Technical Director. Age 35, college graduate. Seven years experience in electrochemistry and electroplating in a large metal finishing laboratory and department including all phases of electroplating and anodizing, control, research, and development, trouble-shooting and production. Prefer Metropolitan Area. Reply to Box Jy 3, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Plating and Finishing Chemist. Experienced in all phases of plating, anodizing, lacquering, laboratory control, and supervision. Age 29. Prefer Mid-West location. Reply to Box Jy 4, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Metal Finishing Engineer. Chemistry and Metallurgy background. Production experience in large plating plant operation. Responsible for mfg. processes, solution control, trouble-shooting and cost reduction. Desires Technical Service-Sales position. Reply to Box Jy 5, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Plating Foreman. 10 years progressive, varied, job shop experience in Plating. Cadmium, silver, copper, nickel, chrome, phosphating, plating over aluminum, black oxide treatments. Anodizing, also barrel finishing operations. Can setup and control departments. Quality control, time study, maintain solutions, effect time saving operations, salary start $9000. Prefer busy Job Shop in N. Y. C. area. Reply to Box Jy 6, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Have over thirty years experience in supervision of all phases of polishing, buffing, plating, paint, assay, etc. Make and control of all solutions, lab. control, supervision of all types of equipment from hand operated to the largest automatics. Have job shop experience to high production, including BBL. plating, tumbling, zinc, cadmium, copper, nickel, chrome, tin, anodizing. Will sell, or locate anywhere. Complete information upon request. Reply to Box Jy 7, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—PLATING SUPERVISOR. Specialist in precious metals and other finishes. Decorative and specification experience in the jewelry and Electronic fields. Available for interview first two weeks in July. Best references. Reply to Box Jy 8, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Plating Superintendent with 21 years experience. 41 years old, married, 2 years college credit in Chemical Engineering. 11 years of strip steel plating, 5 years electropolishing and 3 years of hard chrome plating. Some time study experience. Last 7 years as Supt. with good labor relations record. Reply to Box Jy 9, PLATING, 445 Broad St., Newark 2, N. J.

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WANTED—DISTRIBUTORS AND SALES REPRESENTATIVES. A leading eastern manufacturer of a complete line of buffing and polishing compounds has open territories for Distributors or Sales Representatives. If you have experience and a following in the field, please write to Box Jy 11, PLATING, 445 Broad St., Newark 2, N. J.

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FUTURE MEETINGS

AMERICAN ELECTROPLATERS' SOCIETY

July 26—**Detroit Branch,** Stag Day, Hillcrest Country Club, Mount Clements, Mich.

September 17—**Research Committee Meeting,** National Headquarters, Newark, N. J.

September 19–20—**Executive Board Meeting,** Hotel Statler, Detroit, Mich.

September 26—**Editorial Board Meeting,** National Headquarters, Newark, N. J.

October 4—**Montreal Branch,** Annual Dinner-Dance, Queen's Hotel, Montreal, Canada.

Oct. 31–Nov. 1—**Philadelphia Branch,** Annual Educational Session and Banquet, Hotel Sheraton, Philadelphia, Pa.

December 4–5—**Detroit Branch,** Annual Educational Session and Banquet, Hotel Statler, Detroit, Mich.

January 31, 1959—**Cleveland Branch,** Annual Educational Session and Dinner-Dance, Cleveland, Ohio.

February 13–14, 1959—**Dixie Regional Group,** Educational Session and Banquet, Southeastern Host Branch, Dinkler Plaza Hotel, Atlanta, Ga.

February 14, 1959—**Sixth Interim Meeting,** Dixie Regional Group Sponsor, Southeastern Host Branch, Dinkler Plaza Hotel, Atlanta, Ga.

March 7, 1959—**Rockford Branch,** Annual Educational Session and Banquet, Faust Hotel, Rockford, Ill.

April 4, 1959—**Fifth Tri-State Regional,** Louisville Host Branch, Louisville, Ky.

April 11, 1959—**Baltimore-Washington Branch,** Annual Banquet and Dance, Presentation of Pot.

June 15–18, 1959—**Golden Jubilee Convention and International Exposition, Including Fifth International Conference on Electrodeposition and Metal Finishing,** Detroit, Mich.

July 10–14, 1960—**47th AES Annual Convention,** Hotel Statler, Los Angeles, Calif.

June 18–23, 1961—**48th AES Annual Convention,** Hotel Statler, Boston, Mass.

June 25–28, 1962—**49th AES Annual Convention,** Schroeder Hotel, Milwaukee, Wisc. Sponsorship Midwest Regional Council.

June 24–27, 1963—**50th AES Annual Convention,** Ambassador Hotel, Atlantic City, N. J. Sponsorship Newark Branch.

INTERSOCIETY

September 12—**Society of Plastic Engineers,** Regional Technical Conference, St. Clair Inn, St. Clair, Mich.

Sept. 28–Oct. 2—**The Electrochemical Society,** Fall Meeting, Chateau Larier, Ottawa, Canada.

October 27–31—**40th National Metal Exposition and Congress,** Sponsored by American Society for Metals, Cleveland Public Auditorium, Cleveland, Ohio.

November 18–20—**9th National Conference on Standards,** American Standards Association, Hotel Roosevelt, New York, N. Y.

March 17–19, 1959—**National Association of Corrosion Engineers,** 15th Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill.

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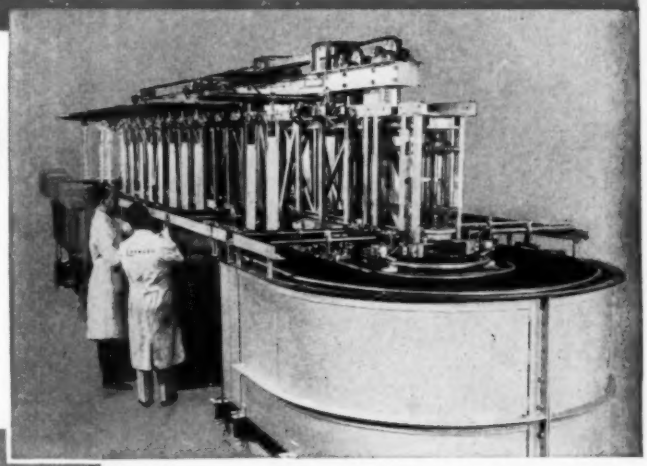

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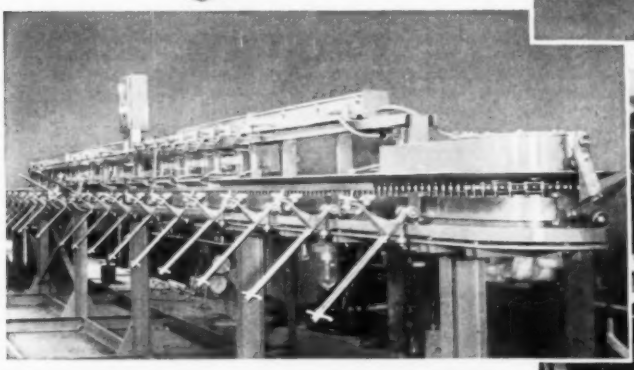

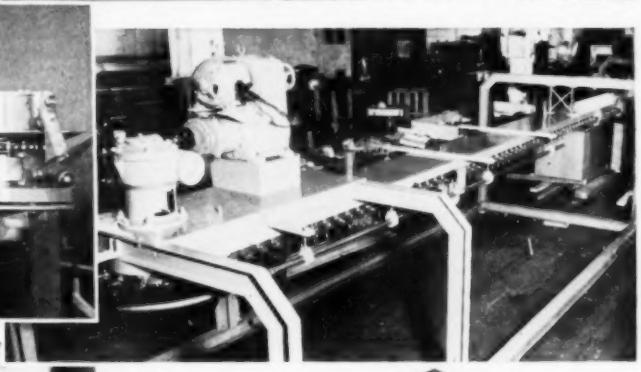

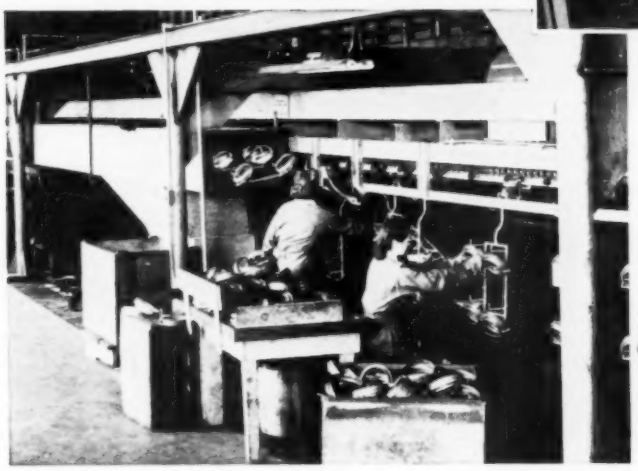

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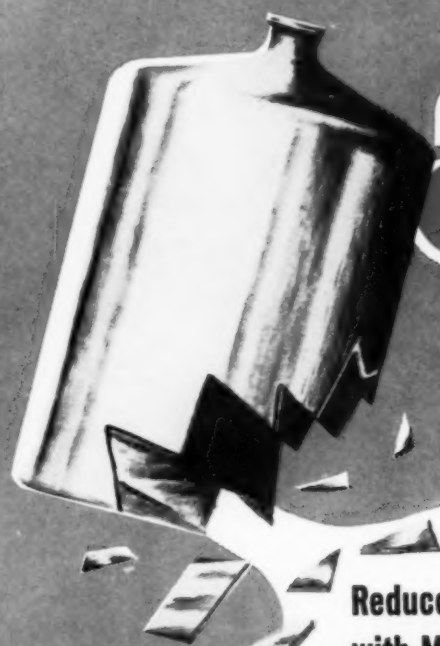

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